Review Article

Hepatitis C Virus Infection: Epidemiological, Diagnostic and Therapeutic Aspects at the Departmental and Teaching Hospital of Borgou-Alibori

Saké K[1]*; Attinsounon CA[1]; Kpossou AR[2]; Tobada ES[1]; Fanou CD[3]; Ahanhanzo Glèlè R[4]; Kèkè KR[4]; Gbedo SE[5]; Savi de Tové K-M[1]; Sèhonou J[2]; Kodjoh N[2,5]

[1]Department of Medicine and Medical Specialties, Faculty of Medicine, University of Parakou, Benin

[2]Department of Medicine and Medical Specialties, Faculty of Health Sciences, University of Abomey-Calavi, Benin

[3]Hepato-Gastro-Enterology Department, Army Training hospital - Teaching Hospital, Parakou, Benin

[4]Health Program to Fight AIDS, Benin

[5]National Hepatitis Control Program, Benin

*Corresponding author: Saké Khadidjatou

Hepato-Gastroenterologist, Department of Medicine and Medical Specialties, Faculty of Medicine, University of Parakou, BP: 123 Parakou, Benin.

Tel: 00229 65310564

Email: khadisak@yahoo.fr

Abstract

Introduction: Hepatitis C Virus (HCV) infection is a global public health problem. The epidemiology of this condition in Parakou is still poorly understood. The aim of this study was to investigate the epidemiological, diagnostic and therapeutic aspects of hepatitis C virus infection in the internal medicine department of the Departmental and Teaching Hospital of Borgou-Alibori (DTH-B/A), Parakou.

Patients and Methods: This was a descriptive cross-sectional study with retrospective data collection. It concerned patients received in hepato-gastroenterology consultation from 1st January, 2017 to 30 June, 2021. Patients who had undergone a minimal pre-therapeutic workup, which included testing for hepatitis C virus antibodies (anti-HCV Ac) and quantification of viral RNA by PCR, were included. The data were collected from each patient's medical record and transcribed on a pre-established collection form. Analysis was performed using Epi Info software version 7.2.

Results: During the study period, 2786 patients were seen in hepato-gastroenterology consultations. Among them, 142 patients (5.1%) were HCV-positive. Of these seropositive patients, 73 (51.4%) met the inclusion criteria and were selected for the present study. The mean age was 45.5±14.7 years. Thirty-nine (53.4%) were male, for a sex ratio of 1.2. Forty-seven (64.4%) had progressive HCV infection with detectable RNA, including 3 (6.4%) at the stage of liver cirrhosis. Treatment was indicated in these 47 patients (64.4%) and was effective in 35 (74.5%). In all these patients, the HCV RNA test at the control PCR at least three months after the end of treatment was negative (undetectable RNA), representing a sustained virological response of 100%.

Conclusion: At DTH-B/A, HCV infection most often affects young adult males. Viremic forms are in the majority. Treatment with direct-acting antivirals remains highly effective.

Keywords: HCV; Epidemiology; Direct action antivirals; Parakou; Benin

Abbreviations: Anti-HCV Ac: Antibodies to Hepatitis C Virus; ALAT: Alanine Aminotransferases; APRI: Aspartate Aminotransferase to Platelet Ratio Index; RNA: Ribonucleic Acid; ASAT: Aspartate Aminotransferases; DTH-B/A: Departmental and Teaching Hospital of Borgou-Alibori; NTH-HKM: National and Teaching Hospital -Hubert Kutuku Maga; HCV: Hepatitis C Virus; HBV: Hepatitis B Virus; HIV: Human Immunodeficiency Virus; PCR: Polymerase Chain Reaction

Introduction

Hepatitis C Virus (HCV) infection is a global public health problem. In fact, according to the World Health Organization (WHO) in 2015, 71 million people were chronically infected with HCV [1]. In 2019, the WHO estimated that 1.5 million new HCV infections occur each year and that around 290,000 deaths per year are attributable to complications of chronic hepatitis C worldwide [2]. According to Markov model analysis, by 2030, 30% of deaths will be due to complications of HCV infection [3]. With the aim of reducing mortality from chronic viral hepatitis, in 2016 the World Health Assembly approved targets set by the WHO for the elimination of these conditions. These targets aim to reduce global incidence of Hepatitis B Virus (HBV) and HCV infection by 90% and mortality by 65% by 2030 [4].

In Benin, the national prevalence of HCV infection is unknown. Kodjoh et *al* [5] in a study carried out in 2013, noted a prevalence of 4.12% for HCV infection among new blood donors. Another study carried out in 2019 at the National and Teaching Hospital - Hubert Kutuku Maga (NTH-HKM) in Cotonou by Kpossou et *al.* [6] found a hospital frequency of 5.7% for HCV infection. The epidemiology of this condition is still poorly understood in Parakou, in the northern part of Benin. We felt it necessary to take stock of the epidemiological, diagnostic and therapeutic situation of patients carrying anti-HCV Ac in Parakou.

The aim of this study was to investigate the epidemiological, diagnostic and therapeutic aspects of HCV infection at DTH-B/A.

Patients and Methods

Type and Period of Study

This was a descriptive cross-sectional study with retrospective data collection taking into account patients seen in hepato-gastroenterology consultations from January 1st, 2017 to June 30th, 2021.

Study Framework

The study took place in the Internal Medicine Department of the Departmental and Teaching Hospital of Borgou -Alibori, Parakou.

Study Population

It is made up of all patients received and/or screened positive for antibodies to HCV (anti-HCV) and followed up in the department during the study period.

- **Inclusion criteria**

Those who were able to complete the minimum pre-therapeutic work-up: HCV RNA quantification, aminotransferase assay, prothrombin level, blood count and abdominal ultrasound, were included.

- **Exclusion criteria**

All patients with incomplete minimum workup, including failure to quantify HCV RNA, were excluded from the study.

Sampling

All patients meeting the inclusion criteria were recruited during the study period.

Variables

The dependent variable was anti-HCV Ac positivity. The in-dependent variables concerned epidemiological, clinical, para-clinical, diagnostic, therapeutic and treatment-related data.

Data Collection

The medical records of patients who consulted the hepato-gastroenterology department of the DTH-B/A internal medicine service were used. The information collected was transcribed onto a specially designed form.

Diagnostic Criteria

Positive diagnosis of cirrhosis was non-invasive based on variable associations of the following clinical and paraclinical signs: Aspartate aminotransferase to Platelet Ratio Index (APRI) score greater than 2 [7]; liver changes on clinical examination and imaging (painless, hard, sharp lower border, granulated anterior surface hepatomegaly; hepatic dysmorphia on ultrasound); signs of portal hypertension (collateral venous circulation, splenomegaly, thrombocytopenia, dilatation of the portal trunk on ultrasound, oesophageal varices); signs of hepatocellular insufficiency (white fingernails, palmar erythrosis, gynecomastia, low prothrombin level, low albumin level)

In the present study, aminotransferases, prothrombin levels and blood counts were considered as standard biological parameters.

Performing Examinations

Clinical examination was performed by a hepato-gastroenterologist. HCV RNA quantification was performed by real-time PCR at Benin's national virology reference laboratory in Cotonou by a medical biologist. Abdominal ultrasound was performed by radiologists.

Data Processing and Analysis

Data were collected from patients' medical records. Analysis was performed using Epi Info version 7.2 software. Qualitative variables were expressed as numbers and percentages. The mean and standard deviation were used for quantitative variables.

Table 1: Distribution of HCV-positive patients according to clinical signs (DTH-B/A, Parakou, 2017-2021, N=73).

	Numbers	%
Functional and general signs		
Asthenia	44	60.3
Abdominal pain	27	37
Constipation	27	37
Weight loss	21	28.8
No sign	19	26
Arthralgia	17	23.3
Increased abdominal volume	2	2.7
Méléna	1	1.4
Physical examination		
Normal	63	86.3
Abnormal	10	13.7
Anomalies found (n=10)		
Hepatomegaly	6	60
Icterus	1	10
Splenomegaly	1	10
Pelvic limb edema	1	10
Right flank pain	1	10

NB: The same patient may present more than one symptom.

Table 2: Distribution of HCV-positive patients according to standard biological workup (DTH-B/A, Parakou, 2017-2021, N=73).

	Numbers	%
ASAT		
Normal	51	69.9
High	22	30.1
ALAT		
Normal	47	64.4
High	26	35.6
Prothrombin levels		
Normal	65	89
Bottom	8	11
Hemoglobin level		
Normal	56	76.7
Bottom	17	23.3
Number of wafers		
Normal	58	79.5
Bottom	11	15.1
High	4	5.5

ASAT: Aspartate Aminotransferase ; ALAT: Alanine Aminotransferase

Ethical Considerations

For this retrospective study, the data collected were processed anonymously and confidentially.

Results

During the study period (January 1st, 2017 to June 30th, 2021), 2786 patients were seen in hepato-gastroenterology consultations. Anti-HCV testing was positive in 142 patients. Of the latter group, only 73 (51.4%) were able to complete the minimum pre-therapeutic workup and were the subject of the present study.

Epidemiological Data

The mean age of included patients was 45.5±14.7 years, with extremes of 17 and 80 years. Patients aged 40 to 59 years were the most represented (33 or 45.2%). Of the 73 patients included, 39 (53.4%) were male, giving a sex ratio of 1.2.

In terms of socio-professional status, 6 patients (8.2%) were healthcare workers and 22 (30.1%) were employees in the public and private sectors.

Of the 73 HCV-positive patients, 12(16.4%) had a family history of HCV infection. Sixty-two (84.9%) had a history of scarification. Nine patients (12.3%) consumed alcoholic beverages. The mean quantity of alcohol consumed was 41.1±17.6 grams/day, with extremes of 20 and 60 grams/day.

Diagnostic Aspects

- Clinical data

The main circumstance of discovery was screening (38 patients or 52.1%), either during a campaign or a systematic check-up. Five patients (6.8%) tested positive for HCV during a blood donation. Twenty-nine patients (39.7%) had consulted their doctor less than a month after the discovery of positive HCV serology. The delay between first consultation and diagnosis was greater than 12 months in 26 patients (35.6%). Of the 73 HCV-positive subjects included, 54 (74%) were symptomatic. Asthenia was reported by 44 patients (60.3%), but the physical examination was normal in 63 patients (86.3%). Table I shows the distribution of patients according to clinical signs.

- Paraclinical data

Table II shows the distribution of patients according to the results of standard laboratory tests.

Of the 73 patients included in the study, 72 (98.6%) had been tested for HBsAg and antibodies to the human immunodeficiency virus (anti-HIV). HBsAg was positive in 4 patients (5.6%) and anti-HIV was positive in 1 patient (1.4%).

Of the 73 patients included, HCV RNA was detectable 47 times, or 64.4% of cases. Genotype was determined in 11 patients: genotype 2 in 10 cases (90.9%) and genotype 3 in a single case (9.1%).

- Non-invasive evaluation of liver fibrosis

Three patients (4.1%) had clinically significant fibrosis, or even cirrhosis, with an APRI score greater than 2.

Of the 73 patients included, 47 (64.4%) had progressive HCV infection and 26 (35.6%) were spontaneously cured with positive anti-HCV Ac but undetectable HCV RNA.

Therapeutic Data

Treatment was indicated for 47 of the 73 patients (64.38%), but 35 (74.47%) were able to benefit from it.

The combination sofosbuvir (400mg) + velpatasvir (100mg) daily for 12 consecutive weeks was used to treat patients. The 3 patients with cirrhosis received Ribavirin in addition.

All patients complied well with treatment, and no significant adverse events were reported. Three months after the end of treatment, control HCV RNA was undetectable in all 35 patients, demonstrating a sustained virological response.

Discussion

To our knowledge, this study is one of the first to be carried out in northern Benin. It examined the epidemiological, diagnostic and therapeutic aspects of HCV infection at DTH-B/A.

This work has filled the information gap on this condition and will serve as a basis for estimating the real needs for implementing the national policy to combat viral hepatitis in Benin.

In the present study, the mean age of patients was 45.5±14.7 years. HCV infection was more prevalent in younger adults. Kowo et al [8] in 2018 in Cameroon had found a mean age close to ours (44.24±8.22 years). Sombié et al [9] in Burkina Faso in 2011 also found a mean age of 47 years. The young age of patients in these sub-Saharan studies could be explained by risky procedures such as scarification. In this study, more than 8 out of 10 patients were scarified.

A male predominance was noted with a sex ratio of 1.2 in the study population. The same observation was made by Kodjoh et al [10] in Cotonou, Benin in 2014 with a sex ratio of 3.6 and by Sombié et al. [11] in Burkina Faso in 2011 with a sex ratio of 1.9.

The most common risk factor found in this study was scarification (84.93%). The same finding was made by Kodjoh et al. [10] (52.6%) in Cotonou, Benin in 2013; but also by Kowo et al [8] (71.3%) in Douala and Yaoundé in Cameroon in 2015. This result can be explained by the fact that this practice is particularly widespread in sub-Saharan Africa in general and in the northern regions of Benin in particular. The procedure is often performed using non-sterile equipment. The use of the same

cutting equipment on several people during scarification entails a risk of direct contact with blood, which favors HCV transmission. Six healthcare workers were positive for anti-HCV Ac. The health professional is recognized as a subject at risk, especially because of blood exposure accidents.

In this study, the main reason for discovery was screening (52.1%). Kowo et al [8] in Douala and Yaoundé, Cameroon, in 2015, also found systematic screening to be the main circumstance of discovery (86.8%). This can be explained by the fact that chronic viral hepatitis is often asymptomatic.

In the present study, HCV-VHB co-infection was found in 4 patients (5.6%). This result is relatively higher than those found by other authors such as Kpossou et al. [6] in Cotonou, Benin in 2019 (0.2%) and Kowo et al. [8] in Douala and Yaoundé, Cameroon, in 2015 (2.1%). The high rate of HCV-HBV co-infection in our study could be explained by the fact that the departments in the northern part of Benin, the location of the study, have a higher prevalence of HBV infection [5]. HCV-HIV co-infection was found in 1 patient (1.4%). This rate of co-infection is relatively lower than those reported by Kodjoh et al [10]. in Cotonou, Benin in 2012 (3%) and Kowo et al. [8] in Douala and Yaoundé, Cameroon, in 2015 (2.8%).

In this study, HCV RNA was detectable in 47 patients (64.38%). This means that more than six out of ten HCV-positive subjects had viral replication. This corroborates the data in the literature according to which after an acute HCV infection, about 20-30% recover spontaneously and 70-80% retain the virus chronically [11-13]. But according to Kpossou et al [14] At the CNHU-HKM of Cotonou in 2020, out of 118 patients with positive anti-HCV antibodies, the search for HCV RNA was carried out in 53 (44.9%) and was detectable in 51 patients (96.2%).

Therapeutically, the 12 patients who were eligible for treatment but could not benefit from it were either dead or lost to follow-up and unreachable. All patients were started on Sofosbuvir and Velpatasvir with or without Ribavirin for 12 weeks. Sustained Virological Response (SVR) was noted at 100%. This result confirms the data reported in ASTRAL-1, a phase III therapeutic trial in the United States of America (USA) [15]. In this study, 98% of patients treated with sofosbuvir + velpatasvir achieved SVR. These results are confirmed by a study by Mangia et al [16] in 2019, which involved 12 cohorts from 7 European and North American countries. SVR was 98.9%.

However, our study has certain limitations. Being a retrospective study, we did not have access to all the information on risk factors. In addition, the high financial cost of the pretherapeutic assessment meant that we were unable to include a large number of patients.

Conclusion

At DTH-B/A in Parakou, HCV infection most often affects adult males. More than half our patients have progressive chronic viral hepatitis C, with clinically significant liver fibrosis in one in ten cases. Treatment with direct-acting antivirals achieves a sustained virological response in all treated patients. Another prospective study involving a larger number of patients will investigate factors associated with HCV infection in Parakou.

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