

Full Length Research Paper

Hepatitis C virus infection in patients infected with human immunodeficiency virus in Cotonou, Benin

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Received 7 February, 2019; Accepted 12 March, 2019

Screening of Hepatitis C virus (HCV) infection by molecular test is not routinely performed for the care of human immunodeficiency virus (HIV) infected patients in most countries of Sub-Saharan Africa such as Benin. The aim of this study was to assess the extent of HCV infection in patients infected with HIV in Cotonou. This study was conducted from February to June 2017 on HIV infected patients from the National Reference Center for Research and Management of HIV infection in Cotonou. Blood samples were collected from patients to detect anti-HCV antibody and HCV viral load. A total of 205 patients were tested, out of which 67.3% were females. Seroprevalence of anti-HCV antibody was 7.8% and HCV viral load was detectable in 3.4% of cases with a median of 2.200.000 IU/mL (6.3 Log₁₀). Three out of seven patients (42.8%) had negative HCV serology with positive HCV RNA detection. In conclusion, the prevalence of HCV infection among HIV infected patients is not negligible in Cotonou. Universal access to molecular tests is needed in the country to detect HCV infection in these patients.

Keywords: HCV, HIV, prevalence.

INTRODUCTION

Viral hepatitis C is an international public health challenge, comparable to other major communicable diseases, including human immunodeficiency virus (HIV) and viral hepatitis B. Hepatitis C is an inflammatory liver disease caused by the hepatitis C virus (HCV). HCV is an RNA (Ribonucleic acid) virus that is mainly transmitted by parenteral transmission. It rarely leads to acute hepatitis but more often (in 85% of cases) to chronic hepatitis, the severity of which varies (WHO, 2015a).

HIV infection is a chronic systemic infection that

causes severe human immunosuppression. HIV is an RNA transmitted through sexual, blood and vertical routes. HIV mortality from opportunistic infections has declined significantly over the past two decades, due to the success of highly active antiretroviral therapy (ART). On the other hand, chronic liver disease is increasingly recognized as a major cause of morbidity and mortality in patients living with HIV co-infected with HBV or HCV (Bonacini et al., 2004; Ioannou et al., 2013).

In 2015, about 71 million people were chronically

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carriers of HCV worldwide (WHO, 2015b). Similarly, there were 36.9 million people infected with HIV, 70% of whom resided in Sub-Saharan Africa (WHO, 2015c). Among people living with HIV (PLHIV) in 2015, the WHO estimated that 2.7 and 2.3 million people were chronically infected with hepatitis B virus (HBV) and HCV respectively, (WHO, 2015a). In these patients, hepatic disease is characterized by faster progression with acceleration to fibrosis, cirrhosis and hepatocellular carcinoma (Fierer et al., 2013). Although the introduction of antiretroviral therapy has reduced the mortality rate and the incidence of Acquired Immunodeficiency Syndrome (AIDS) in PLHIV, co-infection with HBV or HCV has emerged and is one of the main causes of morbidity and mortality in these people (Lewden et al., 2005). It is therefore necessary that co-infection with these viruses be diagnosed early in order to establish an appropriate and effective treatment, particularly for hepatitis C, which is currently curable after a treatment that is certainly expensive but increasingly available (WHO, 2015b). In Benin, data exist on HIV/HBV co-infection. Screening for HBV infection is currently included in the minimum free assessment package for PLHIV (Dovonou et al., 2015; Affolabi et al., 2017). However, limited data is gotten from the free assessment package on HIV/HCV co-infection. In addition, the few available studies have relied heavily on serologic testing and do not capture the actual situation of HCV infection among PLHIV (Sehonou et al., 2012). This research determines the extent of HCV infection in HIV infected patients in Cotonou, the largest city in Benin.

MATERIALS AND METHODS

Setting

Benin is a country with a landmass of 114,763 square kilometers and an estimated population of 10.9 million (UNDP, 2017). Cotonou is the biggest city in the country with a population of about 679,000 in 2013 (INSAE, 2013) and the National Reference Center for Research and Management of HIV infection is located in the city.

Subjects

This cross-sectional study was conducted from February to June 2017. The sample size was determined according to Schwartz's formula thus:

$$N = \frac{\Sigma^2 [p (1-p)]}{I^2}$$

N = the sample size

Σ = the small difference ($\Sigma = 1.96$) at the 5% threshold

I = the agreed accuracy: (5%)

p = the percentage of anti-HCV antibody positivity (14.0%) by considering the seroprevalence obtained in Benin by Sehonou et al. (2012).

Based on these elements, the minimum number of people living with HIV to be included for this study was 185. A total of 205 people living with HIV (15 years and above) under ART treatment or not, during the study period were included in the study.

Samples

Venous blood sample was collected into two tubes from each subject. Ethylenediaminetetraacetic acid (EDTA) tubes were used to collect blood for plasma separation (viral load measurement) while plain tubes were used for serum separation (serology).

Tests

All tests were performed and interpreted according to manufacturer's instructions. Internal quality controls were performed for each run of tests. HIV screening was performed using rapid immuno-chromatography-based tests: Alere Determine HIV-1/2 ® (Alere Medical, Japan) for screening. Reactive samples were confirmed by Immuno Comb HIV 1 and 2 BiSpot ® (Orgenics, France). Anti-HCV antibody was detected using rapid immuno-chromatography kit One Step Anti-HCV® Rapid Screen Test (Micropoint, USA). HCV viral load measurement was carried out using Cobas TaqMan ® 48 kit (Roche Diagnostics, USA).

Ethical considerations

All patients gave informed consents and the study was approved by the institutional review board.

Data analysis

Data were collected using Epi Data version 3.1 and statistical analyses were performed using Stata software version 12.0.

RESULTS

A total of 205 HIV-infected patients were enrolled in the study. Their characteristics are presented in Table 1. Median age of patients was 42.0 years with a male:female ratio of 1.0:2.0. Seroprevalence of anti-HCV antibodies was 7.8% (16/205); 95% confidence intervals (CI): 5.9 - 9.7. HCV viral load was detectable in 3.4% of cases (7/205) with a median of 2.200.000 IU/mL (6.3 Log₁₀) (Table 1). Three out of seven patients (42.8%) had negative HCV serology with positive detecting HCV RNA (Table 2).

DISCUSSION

Due to the high prevalence of HIV/HCV co-infection in sub-Saharan Africa, its' burden needs to be assessed in each setting for proper programmatic management of both diseases. At individual level, diagnosing HCV infection in an HIV infected patient is crucial for choosing an appropriate therapy and treatment follow-up.

In this study, the prevalence of anti-HCV antibodies was 7.8%. This prevalence is comparable to 8.0% found in Senegal (Diop-Ndiaye et al., 2008) among PLHIV. However, it is lower than the rates of 14.0, 13.6 and 13% reported in Benin (Sehonou et al., 2012); Spanish (Portocarrero et al., 2018) and India (Sharma et al., 2018) respectively. Why there is a variation in the prevalence of

Table 1. Characteristics of patients included in the study.

Variable	Number	Percentage
Gender		
Male	67	32.7
Female	138	67.3
Age (years)		
15-24	12	5.9
25-34	37	18
35-44	68	33.2
45-54	57	27.8
≥ 55	31	15.1
Serology for detecting anti-HCV antibody		
Positive	16	7.8
Negative	189	92.2
PCR for detecting HCV RNA		
Positive	7	3.4
Negative	198	96.6

Table 2. Comparison between serology for detecting anti-HCV antibody and PCR for detecting HCV RNA

Anti-HCV	PCR		Total
	Positive	Negative	
Positive	4	12	16
Negative	3	186	189
Total	7	198	205

HCV antibody carriage among PLHIV from one country to another while belonging to the same geographic area with relatively comparable lifestyles is not yet known. The serological test used can be a source of variation. The seroprevalence in this study is higher than that of 4.12% found in Benin nationally among new donors in blood centres (Kodjoh et al., 2012) and the 5.3% found in West Africa in the general population (Gower et al., 2014). This observation confirms that the risk of being infected with HCV is higher in PLHIV than in the general population.

HCV viral load was detectable in 3.4% of cases with HIV/HCV co-infection in our study. This prevalence is higher than that of 0.05% found by Zeba et al. (2014) in Burkina Faso among blood donors. This co-infection rate is lower than the rates of 11.8 and 51.7% reported by Antonello et al. (2016) in Brazil and Shu-Zhi et al. (2017) in China respectively, among PLHIV. Differences in prevalence rates of HIV/HCV co-infection depend on the prevalence of HCV infection in the general population and also the sensitivity of the Polymerase chain reaction (PCR) technique used.

Among co-infected subjects in our study, three out of seven patients (42.8%) had negative HCV serology with

positive HCV RNA detection. Shu-Zhi et al. (2017); Podlekareva et al. (2008) and Liu et al. (2005) found negative serology with positive detection of HCV RNA in 26.6, 11.0 and 19.5%, respectively, among co-infected HIV/HCV. This is because HIV-induced immune-suppression could make anti-HCV antibody testing negative as well as the quality of the serological test used. Hence the interest of PCR, especially if the patient has other risk factors for HCV. In addition, PCR eliminates false positive antibody tests or cured patients from previous contact with HCV (in 12 patients in this study).

This study has some limitations. There has been a lack of information among PLHIV regarding risk factors, such as history of blood transfusion, scarification, tattooing, multiple sex partners, injection drug use, or nasal use. There is also missing information on how many PLHIV are on ARVs, and how many were known to be HCV+ and already treated. Genotyping to identify different HCV genotypes and to make a choice of drug was not available in this study, as was the HIV viral load and the CD4 (cluster of differentiation 4) cell count of the patients included.

The strengths of the study: this is the first study in Benin evaluating the true extent of HCV among PLHIV because it has used both serology and PCR. The study took place in the largest PLHIV care centre in Benin.

Conclusion

The prevalence of HCV infection in PLHIV is not negligible in Cotonou. Serology tests lack sensitivity to diagnose HCV infection in these patients and molecular tests should be used instead. Therefore, universal access to molecular tests in HCV high endemic countries cannot be over emphasised.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENT

The authors are thankful to the National AIDS Programme of Benin and The National Reference Laboratory for Mycobacteria, Cotonou, Benin.

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