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Prevalence and risk factors of hepatitis C virus among HIV-infected patients in Brazzaville, Republic of Congo

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Abstract

Background: Hepatitis C virus (HCV) infection among people living with Human Immunodeficiency virus (HIV) is a major global health problem characterized by lack of effective vaccines, chronicity and associated mortality. The aim of this study was to evaluate the prevalence and risk factors of HCV infection among HIV-infected patients in Brazzaville. Methods: This cross-sectional study was carried out in the HIV/AIDS ambulatory treatment center in Brazzaville, Republic of Congo, from June to November 2018. Demographic and risk factors were collected using a structured questionnaire. HCV was detected using ELISA test and collected data was analyzed by SPSS v-21 software. Results: A total of 200 HIV-infected patients were enrolled in this study including 143 women (71.5%) and 57 men (28.5%). The mean age was 43.7±13.6 years old. The prevalence of HCV infection among HIV-positive patients was 4.5% (9/200). This rate was high for men (5.3%) and those over 45 years of age. However, there was no significant difference in odds of HCV infection in HIV infected participants with demographic data and risk factors. Conclusion: HCV co-infection is frequent among HIV-infected patients in Brazzaville. So, for preventing the serious forms of infection, it is necessary to screen the HCV in HIV-infected patients.

Keywords: Prevalence, Hepatitis C virus, HIV, AIDS, Risk factors, Brazzaville, Congo.

INTRODUCTION

Hepatitis C virus (HCV) and Human Immunodeficiency virus (HIV) infections are major global public health concerns, with overlapping modes of transmission and affected populations (Platt et al., 2016). Worldwide, around 184 million of people have the chronic HCV infection and approximately 399,000 of people die each year (Thrift et al., 2017; Mohd et al., 2013). Africa has been hit hardest by the HIV pandemic and has the HCV second highest prevalence after Asia (Matthews et al., 2014). In addition, almost 4-6 million of people living with HIV are co-infected by the HCV in Sub-Saharan Africa (Mora et al.,2016). Due to increasing access of the antiretroviral therapy (ART) in sub-Saharan Africa, life expectancy for HIV-infected individuals has dramatically improved (Matthews et al., 2014). HCV associated liver disease represents a major cause of morbidity and mortality among the HIV-infected patients (Sulkowski, 2014). HIV increases the speed of HCV related liver disease and accentuating hepatic dysfunction in HIV-infected individuals (Chen et al., 2009). HIV/HCV coinfe-

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ction may have important implications in the therapeutic and evolving plans (Platt et al., 2016; Ensoli and Sirianni, 2002). The Knowledge of its epidemiological and clinical features may help to anticipate the needs and improve care. In the Republic of Congo, the estimated HCV and the HIV prevalence rates are 4.4% and 3.2%, respectively (ESISC, 2009; Deby et al., 2015). However, there is a paucity of data on HCV co-infection among HIV-positive patients (Ibara et al., 2016). The aim of this study was to evaluate the prevalence and risks factors of HCV infection among HIV-infected patients in Brazzaville**.**

MATERIALS AND METHODS

Study design and population

This cross-sectional study was conducted among naïve HIV-infected patients newly diagnosed at the outpatient treatment center for HIV/AIDS in Brazzaville, from June to November 2018. The inclusion criterion was as HIV-infected patients received for the consultation in this center. All the HIV-infected patients under antiretroviral treatment and those co-infected with HIV/HCV were not included. The sample size was estimated was determined using the formula for proportions $n = z^2(p)\ (1\text{-}p)/e^2$, where z is the standard score for the confidence level (1.96), p is the sample proportion; e is the allowable error (5%) and prevalence of 8.6% for HCV were used (Laurent et al., 2007). Written informed consent was obtained prior to data collection in accordance with the Helsinki Declaration and patients were asked to fill the social demographic questionnaire.

Blood processing and virologic tests

A volume of 5 ml of whole blood was collected from each patient using EDTA tubes and all the samples were transported to the laboratory on ice packs or kept at +2 to +8°C. the blood was centrifuged after collection, plasma kept in aliquots of approximately 300µl and stored at −80 °C. The plasma samples were screened for the HCV while using ELISA (enzyme-linked immunosorbent assay) fourth generation's technique.

Statistical analysis

The analysis of the data was done thanks to using the Statistical Package for Social Sciences (SPSS Version-21, USA). the descriptive summary was presented as mean, range, and proportions depending on the scale of the variable. Odds ratio (OR) and 95% confidence intervals (CI) were calculated and the result was considered statistically significant at $p<0.05$.

RESULTS

A total of 200 HIV-infected patients were enrolled in this study, of whom 143 women (71.5%) and 57 men (28.5%) with a sex ratio of 0.39. The mean age was 43.7±13.6 years. Patients over 45 years of age were majority with 49.5%. The prevalence of coinfection of HCV in HIV-positive patients was 4.5% (9/200). This rate was higher among men (5.3%) compared to women (4.2%). However, this difference was not statistically significant (p=0.742). The most of infected persons with HCV belongs to age group from 18-24 years with 4.1%, whereas age group from 25-45 years is represented with 4.1%. Moreover, HCV prevalence was predominant in patients with primary/secondary education (10%) followed by those with university (3.7%). Regarding occupation, the highest rate, 7% were unemployed, followed by employed with 3,8% and the lowest rate was among functionary with 2.7% (Table 1). In addition, HCV prevalence was predominant among married/cohabiting patients with 5.7% compared to single with 4.1%. However, age group, occupation, education level and marital status were not associated with HCV-prevalence (Table 1).

Univariate analysis was performed to assess independent associations between risks factors and HCV infection. HCV rate was higher in HIV-infected participants who reported having histories of blood transfusion (9.5%), ear piercing (6.7%) and surgery operation (5.1%). Multiple sexual partners, history of tooth extraction and circumcision had a relative incidence of exposure in patients co-infected with HIV and HCV. There was no significant difference in odds of HCV infection in participants with HIV risk factors (Table 2).

DISCUSSION

HCV and HIV pose great threats to human health worldwide (Matthews et al., 2014). In this study, we found that the overall prevalence of HCV carriage in HIV-infected patients was 4.5% (9/200). This prevalence rate was consistent with findings from other studies carried out in Malawi (4.5%) (Nyirenda et al., 2008) and Rwanda (4.6%) (Umutesi et al., 2017). However, the prevalence obtained in our study is lower than those previous obtained in studies, 15.7% in Mozambique (Rodrigues et al., 2008) and 72% in Iran (Mohammadi et al., 2009). This prevalence variation may be associated with recruited participants, samples size, age of participants, geographic region, and mode of transmission.

In the current study, HIV/HCV co-infection rate was high among male participants than female which contrasts with the result of the study performed in Nairobi, where the majority of infected participants were females (53.3%) as compared to males (46.7%). However, the difference was not statistically significant (Muriuki et al. 2013).

The statistical analysis of HIV/HCV co-infection did not show significant association with any of the socio-demographic parameters (in age groups, educational status, employment, marital status and residence). Ours results are consistent with the findings by Alemayehu et al. in Ethiopia who reported that HCV infection among

Table 1. Demographics characteristics of HCV coinfection among HIV infected patients at Brazzaville, (n=200).

Characteristics	HIV infected patients			
	No (%) tested	No (%) Positive for anti-HCV	Odds ratio (95% CI)	*P-Value*
Gender				
Male	57(28.5)	3(5.3)	1.27(0.31-5.25)	0.742
Female	143(71.5)	6(4.2)	1	
Age (years)				
18-24	19(9.5)	2(10.5)	1	
25-45	73(36.5)	3(4.1)	0.36(0.06-2.35)	0.288
45-59	108(54.0)	4(3.7)	2.97(0.53-16.67)	0.216
Educational status				
Primary/secondary school	30(15.0)	3(10.0)	3.88(0.38-39.50)	0.251
High school	134(66.5)	5(3.7)	1.36(0.15-11.99)	0.783
University	36(18.0)	1(2.8)	1	
Occupation				
Unemployed	57(28.5)	4(7.0)	2.72(0.29-25.31)	0.380
Self-employed	54(27.0)	2(3.7)	1.38(0.12-15.85)	0.793
Functionary	37(18.5)	1(2.7)	1	
Employed	52(26.0)	2(3.8)	1.44(0.13-16.49)	0.769
Marital status				
Single	147(73.5)	6(4.1)	0.71(0.17-2.92)	0.636
Married/Cohabiting	53(26.5)	3(5.7)	1	

%, percentage; CI: confidence Interval; 1: reference; NA: Not applicable.

Table 2. Distribution of risk factors for HCV infection among HIV infected patients at Brazzaville(n=200).

Characteristics	HIV infected patients			
	No (%) tested	No (%) Positive for anti-HCV	Odds ratio (95% CI)	*P-Value*
Multiple sexual partners				
Yes`	95 (47.5)	4(4.2)	0.87 (0.23-3.37)	0.851
No	105(52.5)	5(4.8)	1	
Blood transfusion				
Yes	42(21.0)	4(9.5)	3.22 (0.82-12.57)	0.092
No	158(79.0)	5(3.2)	1	
Ear piercing				
Yes	15(7.5)	1(6.7)	1.58(0.18-13.55)	0.676
No	185(92.5)	8(4.3)	1	
Scarification				
Yes	106(53.0)	5(4.7)	1.11(0.29-4.27)	0.875
No	94(47.0)	4(4.2)	1	
Surgery				
Yes	59(29.5)	3(5.1)	1.20(0.29-4.98)	0.796
No	141(70.5)	6(4.2)	1	
Tooth extraction				
Yes	91(45.5)	4(4.4)	0.96(0.24-3.67)	0.948
No	109(54.5)	5(4.6)	1	
Circumcision				
Yes	54(27.0)	2(3.7)	0.76(0.15-3.79)	0.742
No	146(73.0)	7(4.8)	1	

HIV infected persons was not associated with age or gender (Alemayehu et al., 2011). In contrast to our results, the studies conducted by Luma et *al.* in Cameroun and that of Bailey et *al.* in Ukraine, a significant relationship was found between HCV/HIV coinfection and age groups, gender, occupation and marital status (Luma et al., 2016; Bailey et al., 2016). On the other hand, the odds of the HCV infection were not proved as being significantly affected by the exposure status of participants to various medical practices. This result contrasts with a finding from Ethiopia where the risk factors including a longer period of the HIV treatment, WHO clinical stage III/IV, previous history of hospitalization, tooth extraction and liver disease significantly increased the odds of the HCV infection (Balew et al., 2014).

Indeed, HCV and HIV share similar transmission routes including sexual, blood contact, and injecting drug usage (Platt et al., 2016). Co-infection with HIV and HCV is very common in some populations, such as intravenous drug users (IDUs) who often share contaminated needles/syringes for intravenous drug injection. It has been reported that the global prevalence of HIV-HCV co-infection among IDUs can surpass 90% in different populations (Zhou et al., 2012; Wiessing et al., 2014). Furthermore, due to the shared mode of transmission, co-infection of HCV and HIV has become a growing public health concern.

CONCLUSION

HCV co-infection is frequent among HIV-infected patients in Brazzaville. Thus, for preventing serious forms of infection, it is important to systematically screen for HCV infection in HIV-infected patients. In addition, studies on the impact of HIV infection in the natural history of HCV and the response to treatment are also necessary.

Abbreviations

HIV: Human Immunodeficiency virus; AIDS: Acquired Immune Deficiency Syndrome; IDUs: Intravenous Drug Users; ART: Antiretroviral therapy; HCV: Hepatitis C virus; Anti-HCV: Anti-HCV antibody; ELISA: Enzyme-linked immunosorbent assay; CI: Confidence Interval; NA: Not applicable.

Conflict of Interest

The authors declare that they have no conflict of interest.

Authors' Contributions

BMA, JFM, FKK, NIN and BIAI conceptualized the study; BMA and NRYO did the initial data collection and sample processing; SOM, GA, BMA, FRN, ALMB and JRI developed the initial draft; all authors read and approved the final manuscript.

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REFERENCES

Alemayehu A, Tassachew Y, Sisay Z and Shimelis T (2011). Prevalence and risk factors of Hepatitis C among individuals presenting to HIV testing centers, Hawassa city, Southern Ethiopia. BMC research notes, 4,193.

Bailey H, Nizova N, Martsynovska V, Volokha A, Malyuta R, Cortina-Borja M and Thorne, C (2016). HCV co-infection and markers of liver injury and fibrosis among HIV-positive childbearing women in Ukraine: results from a cohort study. BMC infectious diseases, 755.

Balew, M., Moges, F., Yismaw, G., & Unakal, C. (2014). Assessment of hepatitis B virus and hepatitis C virus infections and associated risk factors in HIV infected patients at Debretabor hospital, South Gondar, Northwest Ethiopia. *Asian Pacific Journal of Tropical Disease*, *4*(1), 1-7.

Chen TY, Ding EL, Seage III, George R and Kim AY (2009). Meta-analysis: increased mortality associated with hepatitis C in HIV-infected persons is unrelated to HIV disease progression. Clinical Infectious Diseases, 49,1605-1615.

Deby G, Malanda CB, Bossali F, Atipo-Ibara BI, Bokilo-Dzia A, Ahoui-Apendi C and Ibara JR (2015). Séroprévalence des marqueurs des virus des hépatites B et C chez le personnel soignant du CHU de Brazzaville. Journal Africain d'Hépatogastroentérologie, 179-183.

Enquête de Séroprévalence et sur les Indicateurs du Sida au Congo (ESISC-I) (2009). http://www.cnsee.org/pdf/RapSyntESISC.pdf. Accessed 17 June 2018.

Ensoli F and Sirianni MC (2002). HIV/HCV co-infection: clinical and therapeutic challenges. Aids, 16(10),1419-1420.

Luma HN, Eloumou SAFB, Ekaney DSM, Lekpa FK, Donfack-Sontsa O, Ngahane BHM, Mapoure YN (2016). Sero-prevalence and correlates of hepatitis B and C co-infection among HIV-infected Individuals in two regional Hospitals in Cameroon. *The open AIDS journal*, *10*, 199.

Ibara BA, Ossibi PE, Gassaye D, Okouo M and Ibara JR (2016). Aspects epidemiologiques de la co-infection vih-vhb et/ou vhc au centre hospitalier et universitaire de brazzaville. Annale des Sciences de la Santé, 14,1-6.

Laurent C, Bourgeois A, Mpoudi M, Butel C, Mpoudi-Ngole E and Delaporte E (2007). HIV and hepatitis C

virus coinfection, Cameroon. Emerging infectious diseases, 13, 514.
Matthews CP, Geretti AM, Goulder PJ and Klenerman P (2014). Epidemiology of and impact of HIV coinfection with hepatitis B andHepatitis C viruses in Sub-Saharan Africa. Journal of Clinical Virology, 61,20–33.
Mohammadi M, Talei G, Sheikhian A, Ebrahimzade F, Pournia Y, Ghasemi E, Boroun H (2009). Survey of both hepatitis B virus (HBsAg) and hepatitis C virus (HCV-Ab) coinfection among HIV positive patients. Virology journal, 6, 202.
Mohd Hanafiah K, Groeger J, Flaxman AD and Wiersma ST (2013). Global epidemiology of hepatitis C virus infection: new estimates of age-specific antibody to HCV seroprevalence. Hepatology, 57,1333-1342.
Mora N, Adams WH, Kliethermes S, Dugas L, Balasubramanian N, Sandhu J, Layden, JE (2016). A synthesis of hepatitis C prevalence estimates in Sub-Saharan Africa: 2000–2013. *BMC infectious diseases*, *16*(1), 1-8.
Muriuki BM, Gicheru MM, Wachira D, Nyamache AK, Khamadi SA (2013). Prevalence of hepatitis B and C viral co-infections among HIV-1 infected individuals in Nairobi, Kenya. *BMC research notes*, *6*(1), 1-6.
Nyirenda M, Beadsworth MBJ, Stephany P, Hart CA, Hart IJ, Munthali C and Zijlstra EE (2008). Prevalence of infection with hepatitis B and C virus and coinfection with HIV in medical inpatients in Malawi. Journal of Infection, 57, 72-77.
Platt L, Easterbrook P, Gower E, McDonald B, Sabin K, McGowan C, Vickerman P (2016). Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis. *The Lancet infectious diseases*, *16*(7), 797-808.
Rodrigues MDCV, Viotti JB, Braga RF, Lourenço LFS, Antunes CMDF and Lambertucci JR (2008). HIV/HCV coinfection in Infectious Disease Units in Mozambique and Brazil: a comparative study. Revista da Sociedade Brasileira de Medicina Tropical, 41, 518-518.
Sulkowski MS (2014) Management of acute and chronic HCV infection in persons with HIV coinfection. Journal of hepatology, 61,108-119.
Thrift AP, El-Serag HB and Kanwal, F (2017) Global epidemiology and burden of HCV infection and HCV-related disease. Nature reviews Gastroenterology & hepatology, 14,122-132.
Umutesi J, Simmons B, Makuza JD, Dushimiyimana D, Mbituyumuremyi A, Uwimana JM, Nsanzimana S (2017). Prevalence of hepatitis B and C infection in persons living with HIV enrolled in care in Rwanda. BMC infectious diseases, 17, 315.
Wiessing L, Ferri M, Grady B, Kantzanou M, Sperle I, Cullen KJ, Matheï C (2014). Hepatitis C virus infection epidemiology among people who inject drugs in Europe: a systematic review of data for scaling up treatment and prevention. *PloS one*, *9*(7), 1-9.
Zhou YH, Yao ZH, Liu FL, Li H, Jiang L, Zhu JW, Zheng YT. High prevalence of HIV, HCV, HBV and co-infection and associated risk factors among injecting drug users in Yunnan province, China. PLoS One. 2012;7(8), 1-8.