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Prevalence of HIV and HBV and associated risk factors in communal areas: programmatic implications in the peripheral areas of Yaounde

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Abstract

Background:The prevalence of HIV and HBV infections differs from place to place with few evidence on their risk factors. The aim of this study was to evaluate the seroprevalence and risk factors of HIV, HBV in Ottou village, a communal area on the outskirts of Yaounde. **Methods:**A cross-sectional study was carried out from May to September 2018 at "Sainte Monique", a pediatric and gynecologic health centre. Associations between AIDS and HBV knowledge, demographics, behavior factors and blood transfusion and HIV and HBV infection were analyzed using a Chi-square and Odd ratio. Tests were performed using Epi info 7 with $p < 0.05$, as significance. **Results:** Among 153 enrolled participants, the median age was 29 years old with interquartile range from 22 to 36 years. The prevalence of HIV, HBV and the co-infection HIV/HBV was respectively 11.11% (17/153), 14.37% (22/153) and 1.3% (2/153). We found that females were more infected by HIV than men (13.3% vs. 6.3%). Contrariwise, men were more infected by HBV (16.7% vs. 11.4%) however, the differences were not statistically significant, respectively ($p = 0.31$; $p = 0.37$). Univariate analysis identified that multiple sexual partners (OR 3.35, 95% CI: 1.17-9.61, $p = 0.019$) and the lack of awareness on HBV (OR 5.96, 95% CI: 1.97-18.07, $p = 0.0001$) were associated risk factors to contracting HBV whereas having multiple sexual partners was the only identifiable risk factor for HIV (OR 7.5, 95% CI: 1.65-34.06, $P = 0.0064$). **Conclusions:** Targeted, tailored, and comprehensive interventions are urgently needed to prevent the HIV and HBV infections in this locality.

Keywords: Seroprevalence, HIV, HBV, risks factors, communal area.

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Introduction

Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV) infections represent particular health challenge in sub-Saharan Africa [1]. While HIV affects about 35.3 million people [2], WHO estimates that about 400 million people worldwide are infected by hepatitis B virus with high prevalence (8 to 15%) in Africa and Asia [1]. Studies revealed that HBV infection may be present in the two-third of the 35.3 million people living with HIV (PLHIV) in sub-Saharan Africa [1]. Major clinical relevance of this co-infection is that HBV-induced hepatitis in PLHIV leads to higher risks of liver-disease and associated-mortality than reported in HIV mono-infected patients [3, 4]. For HIV, it accelerates progression of HBV- or HCV-associated chronic liver disease as well as a rapid progression to hepatocellular carcinoma (HCC) [5, 6]. HIV is an RNA virus that mainly targets the T-lymphocytes bearing CD4 [7] while HBV is a hepatotropic virus that replicates predominantly in the hepatocytes [8]. Hepatitis B and HIV co-infection is common among patients because of shared routes and mechanisms of transmission [9, 10].

In Cameroon, the new national AIDS control strategy is “test and treat” regardless of lymphocytes TCD4 rate to achieve 90-90-90” target. Fulfilling such strategy implies an early diagnosis and immediate management of patients after being screened. In 2015, the prevalence of HIV/AIDS in Cameroon was on the decline (3.9%) while that of HBV was increasing (12.2%). The prevalence of those infections differs from place to place with few evidence on their risk factors. The importance of implementing appropriate prophylactic care and follow-up of patients mono infected by HBV and by HIV is fundamental. Furthermore, it is also important to identify the HIV/HBV co-infected patients ignorant of their status in the general population since HIV infected patients are systematically put on antiretroviral therapy without information on their HBV status.

This study was undertaken to determine the prevalence of hepatitis B surface antigen (HBsAg), HIV, co-infection of HIV/HBV and risk factors among patients in Ottou village, a peripheral area of Yaounde, the capital city of Cameroon.

Materials and Methods

Participant’s enrolment

A cross-sectional study was conducted from May to September 2018 at “Sainte Monique” pediatric and gynecologic health centre in Ottou. Overall 153 participants were enrolled by Snowball sampling.

Participant recruitment was as follows: through the recommendation of Ministry of Public Health, some male volunteers who meet our requirements: i.e. over 15 years old, and had sexual behavior, including oral and anal sex in the last 12 months. We selected the seeds according to the type of activity places, and encouraged the seeds to drive the same type companions to take part in our investigation. The companions also can drive his companions after his investigation. Ethical approval was obtained from the National Ethics Committee (n° 2018/09/1105/CE/CNERSH/SP) of Cameroon. At the patient’s recruitment site, an information notice was administered to enroll the eligible patients, who then provided their informed consent prior to enrollment into the study. Parent's or guardian's informed concerns was also needed for minors’ participants (less than 21 years of age). In addition, a personal interview with those minors was undertaken concerning some sensitive aspects such as sexuality. Confidentiality was secured by the use of identification codes attributed to each of the study participants.

Demographic, clinical, sexual behavior features

Data were collected on demographics, AIDS and HBV awareness, sexual behavior and blood transfusion in the standardized questionnaires that were administered through face-to-face interviews by the trained physicians. Blood specimens were collected from participants and tested for diagnoses of HIV and HBV. Contact information including the mobile phone number of each participant was recorded. All participants were educated in the general information phase on HIV and HBV and trained on how to practice safe sex during pre-test and post-test counseling provided by this study. Each participant was given RDV to collect result.

Laboratory testing

A total of 5 mL of whole blood was collected from each study participant in a dry tube. Serum samples were collected and kept at -20°C until assays of interest were run. HIV screening test was carried out by the HIV ½ rapid diagnostic tests (Determine™ HIV-1/2, Alere Medical Co., Japan) [11]. Positives HIV tests were then confirmed by OraQuick® Rapid HIV-1/2 Antibody Test (from Orasure Technologies, Inc. Bethlehem, PA 18015 USA) performed with oral fluid, whole blood, serum or plasma as recommended in Cameroon [12]. The detection of HBsAg was performed using serological testing strategy as recommended by

WHO [13], the HBV One Step Rapid Assay DiaSpot® (Jawa Barat, Indonesia). This is a rapid chromatographic immunoassay test strip for visual reading and qualitative detection of HBsAg [14].

Statistical Analysis

Questionnaires were double-entered and then checked for accuracy using Excel 2013 and analysed in Epi info 7 software. Descriptive (mean, frequency and standard deviation) analyses were conducted to describe the demographic characteristics, AIDS and HBV awareness, behavior characteristics, prevalence of HIV and HBV. Categorical data were analyzed by Chi-square test for possible association between variables. Odds ratios (OR) and their 95% confidence intervals (CI) were calculated in univariate analysis for possible presumptive variables. Variables with $p=0.05$ were statistically significant.

Results

General characteristics of study population

During the study period, 153 participants fulfilled the inclusion criteria. The mean age was 30.4 years \pm 5.63 years ranging from 14 to 68 years. Among them, 68.6% (105/153) were females. Most of the study population was under 35 years old (77.1%) as shown in the figure 1. Forty four point six percent (71/153) of study participants were singles and 50.9% (78/153) were employees. For academic standards, 46.4% (71/153) had primary school level of education. Many of these participants declared to have never received an

anti HBV vaccine % (139/153) and % (51/153) were not aware of hepatitis B.

HIV and risk factors

From this study, occupation of study participants was associated to HIV ($p=0.03$) with students and housewives mostly affected with 20% and 17.5% respectively. Women were more likely to be HIV positives than men ($p=0.31$). Subjects who seemed to be more infected by HIV were: patients of the age group 25 to 35 (16.7%), single (22.5%) and under-educated groups (21.8%), table 1..

Participants with multiple sexual partners were more affected by HIV [18.1% vs.1.3%, $p=0.0064$, OR=7.5]. Subjects with irregular use of condom (12.5%), anogenital intercourses (25%) and surgery antecedent (14.3%) were likely to be HIV positive, table 1.

Factors associated to HBV

Like HIV, sociodemographic and behavioral factors were associated to HBV infection. Occupation of study participants was also associated to hepatitis B ($p=0.011$). Men were more likely to be HBV positive than women (OR:1.63, 95%CI: 0.64-4.13, $p=0.3$). Subjects of the age group 25 to 35 (23.3%), single (16.9%) and under educated groups (28.1%) seemed more infected with HBV. Multiple sexual partners and the lack of awareness on HBV were risk factors ($p=0.019$ and $p=0.0005$ respectively), table 2.

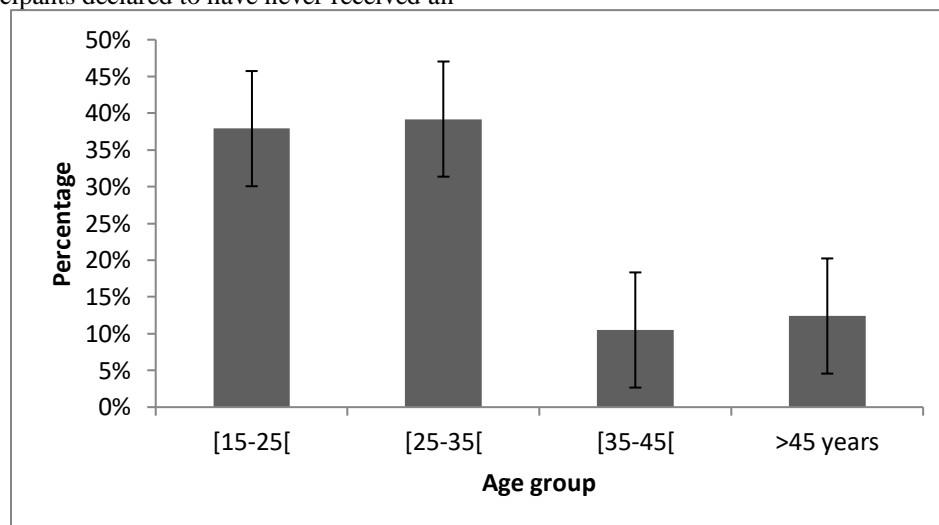


Figure 1: Distribution of the population following age group

Table 1: association between demographic characteristics, risk behavior and HIV

Variables	N=153	HIV Positive 17 (11.1%)	OR	IC95%	p-value
Sex					
Female*	105	14(13.3%)	2.31	0.63-8.44	0.31
Male	48	3(6.25%)			
Age (year)					
[15-25[58	3(5,2%)	NA		0.39
[25-35[60	10(16.7%)			
[35-45[16	2(12.5%)			
45+	19	2(10.5%)			
Use of condom					
Regular	10	0(00,0%)	NA		0.79
Irregular	113	14(12.5%)			
Never	30	3(10.0%)			
Multiple sexual partners					
No	70	2(1.3%)	7.5	1.65-34.06	0.0064
Yes*	83	15(18.1%)			
Types of sexual intercourses			NA		
Genital	114	12(10.5%)			0.79
Oro-genital	31	3(9.6%)			
Ano-genital	8	2(25%)			
Blood transfusion					
No*	143	16 (11.1%)	1.13	0.13-9.54	0.69
Yes	10	1(10%)			

OR=Odds Ratio, *=Reference level of OR ; IC95%= intervals of Confidence 95%
NA=Non applicable ; N=number NA=Non applicable ;

Table 2. Behavioral factors associated to HBV

Variables	Number N=153	HBsAg Positive 22 (14.4%)	OR	IC95%	p-value
Multiple sexual partners					
No	70	5(7.1%)	3.35	1.17-9.61	0.019
Yes*	83	17(20.5%)			
Use of condom					
Regular	10	1(10,0%)	NA		0.99
Irregular	113	16(14.2%)			
Never	30	5(16.7%)			
Statut matrimonial					
Genital	114	18(15.7%)	NA		0.12
Oro-genital	31	1(3.2%)			
Ano-genital	8	3(37.5%)			
Awareness on HBV					
No*	51	12(23.5%)	5.96	1.97-18.07	0.0001
Yes	102	5(4.9%)			
Anti HBV vaccination					

No*	139	17 (12.2%)	1.81	0.22-14.74	0.899
Yes	14	1(7.14%)			
Surgery antecedent					
No	146	20(13.7%)	2.52	0.46-13.88	0.59
Yes *	7	2(28.6%)			
Blood transfusion					
No*	143	21 (14.7%)	1.54	0.19-12.87	0.96
Yes	10	1(10%)			
OR=Odds Ratio, *=Reference level of OR ; IC95%= intervals of Confidence 95% NA=Non applicable ; n=number ;					

Discussion

This community-based survey showed HIV/HBV prevalence among youth in Cameroon. The survey identified wide distribution of HBV seroprevalence compared to HIV. This reflects the prevalence in Cameroon and it is known that HBV is 50 to 100 times more contagious than HIV [15]. Indeed, HBV has been found in virtually all body secretions/excretions and unlike HIV, it can survive outside the body for at least 7 days after which the virus can still cause infection [16]. This prevalence of HBV in Ottou was closer to the national prevalence (12.2%) [17] than HIV (3.9%) [18]). Due to the sample size probably, different results have been found by many authors in Cameroon with 4.1% HBsAg vs 6% HIV [19] and 4.5% HBsAg vs 1% HIV [20]. HIV/HBsAg coinfection was 1.3% (2/153). In the same country Cameroon, contrary results have been already found [21]. A meta-analysis prevalence study included 24 studies (23,295 participants) from seven of the ten Regions in Cameroon which found similar result with an overall HBV-HIV prevalence of 0.8% (95% CI 0.5–1.0; 11 studies) [21] whereas in rural Cameroon different findings have been reported: 8.99% [22], 11.8% [23] and 12.6% [24]. Furthermore, many studies in Ghana have found the similar results of HIV/HBV coinfection prevalence rates [25]. In fact, the prevalence of HIV and HBV varies geographically and depends on exposure to risks factors [26].

Women were more likely to be positive for HIV and HIV/HBV coinfection than men. The findings are similar to the ones of the demographic and health survey carried out in Cameroon in 2011 [27]. A study carried out in a rural village (Mfou-Cameroon) also highlighted a high prevalence of HIV infection and HIV/HBV coinfection among women [23]. According to Cameroon's AIDS control committee, 7 out of 10 people living with AIDS in 2010 were women [27]. For HBV, men were more likely to be HBV positive than women even if gender was not a risk factor. Previous

studies, also found that gender was not a risk factor for HBV infection ($p=0.953$) [28, 29–30]. Diwe et al. in Nigeria reported that men were at higher risk of HBV infection than women due to needle sharing amongst drug addicts [31]

In this study, multiple sexual partners, awareness and occupation were associated to both HIV and HBV infections. The overall high prevalence of HBV in rural setting as determined in this study requires the need for a national policy to offer HBV systematical screening (as done for HIV) as part of the comprehensive care for all patients [32].

Conclusion

This study highlighted the high prevalence of HIV and HBV in Ottou and its associated risk factors such as multiple sexual partners, awareness and occupation. Women seemed to be more vulnerable than men to HIV, whereas men were more likely to contract HBV. So, to achieve the 90-90-90 target, it demands that preventive and treatment should be carefully designed and implemented in communal area.

Disclosure statement

The authors declare that they have no conflicts of interest.

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References

1. Matthews PC, Geretti AM, Goulder PJ and Klenerman P. Epidemiology and impact of HIV coinfection with hepatitis B and hepatitis C viruses in Sub-Saharan Africa. *J Clin Virol.* 2014; 61(1):20-33.
2. UNAIDS, Global Report: UNAIDS report on the global AIDS epidemic 2013, Geneva, Switzerland, 2013. Available from: http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/UNAIDS_Global_Report_2013_en.pdf.
3. Gaeta GB, Precone DF, Cozzi-Lepri A, Cicconi P and D'Arminio Monforte A. Multiple viral infections. *J Hepatol.* 2006; 44 (Suppl 1): S108-13.
4. Nikolopoulos GK, Paraskevis D, Hatzitheodorou E, et al. Impact of Hepatitis B Virus Infection on the Progression of AIDS and Mortality in HIV-Infected Individuals: A Cohort Study and Meta-Analysis. *Clin Infect Dis.* 2009; 48:1763–71.
5. Graham CS, Baden LR, Yu E, et al. Influence of human immunodeficiency virus infection on the course of hepatitis C virus infection: a meta-analysis. *Clin Infect Dis.* 2001; 33(4): 562-9.
6. Mallet V, Vallet-Pichard A and Pol S. The impact of human immunodeficiency virus on viral hepatitis. *Liver Int.* 2011; 31 (Suppl 1): 135-9.
7. African Network for care of children affected by AIDS (ANECCA): The handbook on paediatric AIDS in Africa. 15 January 2014 assessed from <http://www.fhi.org/en/HIVAIDS/pub/guide/manual.html>
8. Uleanya Nwachinemere Davidson, Nwokoye Ikenna Chidiebele, Emodi Ifeoma Josephine, Obidike Egbuna Olakunle, Ikfuna Anthony Nnaemeka, Eze Jude Chijioke, Ndu Ikenna Kingsley, *The Prevalence Liver Function And Immunologic Status Of Children With Hiv And Hepatitis B Virus Coinfection In Enugu, Nigeria*, *Afr. J. Infect. Dis.* 2016; 10(2) :61-68
9. Levy V, Grant RM. Antiretroviral therapy for Hepatitis B Virus-HIV Co-infected Patients: Promises and Pitfalls. *Cl in Infect Dis.* 2006; 43:904-910
10. Thio CL, Seaberg EC, Skolasky R Jr, Phair J, Visscher B, Munoz A, Thomas DL. HIV-1, Hepatitis B Virus, and Risk of Liver-related Mortality in the Multicenter cohort Study (MACS). *Lancet.* (2002); 360:1921-1926.
11. Available: <http://www.msal.gob.ar/sida/images/stories/5-comunicacion/pdf/2014-07-alere-determine.pdf>. Alere Determine™ HIV-1/2 test [En ligne]. [Consulté le 22/08/ 2018].
12. Celine Nguefeu NKENFOU, Japhette Esther KEMBOU Edith Saounde TEMGOUA Appolinaire DJIKENG, Linda Mekue MOUAFO, Elvis Ndukong NDZIE, Irene DONKAM, Vitorrio COLIZZI and Martin SanouSobzé. Evaluation of ORAQUICK® HIV-1/2 as oral rapid test. *Afr. J. Infect. Dis.* 2013; 7(2): 27 – 30.
13. WHO. Guidelines on hepatitis B and C testing. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO
14. Available: <http://sam-techdiagnostics.com/pdfs/HBSag.pdf> Diaspot HBsAg One step Hepatitis B Surface Antigen Test Strip Package Insert [en ligne] [consulté le 22/08/2018].
15. WHO. Hepatitis B. Regional office for South East Asia.
16. Centers for Disease Control and Prevention. Updated U.S. Public Health Service guidelines for the management of occupational exposures to HBV, HCV, and HIV and recommendations for post exposure prophylaxis. *MMWR.* 2001; 50(RR-11):1-52.
17. Richard Njouom, Arnaud Fontanet, 2011. *Projet ANRS 12289 Epidémiologie des hépatites virales B, C, et delta au Cameroun: analyse des échantillons de l'Enquête Démographique de Santé 2011. Centre Pasteur du Cameroun*
18. Comité national de lutte contre le VIH, 2014. *Rapport annuel 2014 des activités de lutte contre le VIH/SIDA et les IST au Cameroun, vers une génération sans sida.* Mars 2015.
19. Mbopi-Keou FX, Kalla GCM, Tchouamani H, Deugoue Kalla C, Mbahe S, Angwafo III F, Ndumbe PM. *Effectiveness of mobile units for mass HIV testing in subsaharan Africa: the Cameroon pioneer experience.* *Health Sc Dis.* 2007; 8 (4): 18-21.
20. Jobert Richie Nansseu, Descartes Maxime Mbogning, Gwladys Chavely Monamele, Stive Fokam Tamoh, Hortense Kamga Gonsu, Charles Kouanfack, et al. *Sero-epidemiology of human immunodeficiency virus, hepatitis B virus and hepatitis C virus: a cross-sectional survey in a rural setting of the West region of Cameroon.* *The Pan African Medical Journal.* 2017; 28:201.
21. Jean Joel Bigna Jan René Nkeck, Anderson Ngouo, Ulrich Flore Nyaga, Jean Jacques Noubiap. *Hepatitis B virus and HIV coinfection among adults residing in Cameroon: A systematic review and meta-analysis of prevalence studies.* *Infections, Disease and Health.* 2018; 23(3):170–178.

22. Jean-Patrick Molu, Marie Chantal Ngonde Essome, Chavely Gwladys Monamele and Richard Njouom. Sero-prevalence of HBsAg in naive HIV-infected patients in a rural locality of Cameroon. BMC Res Notes. 2018. 11:39.
 23. Salpini R, Fokam J, Ceccarelli L, Santoro MM, Nanfack A, Sosso SM, et al. High burden of HBV-infection and atypical HBV strains among HIV-infected Cameroonians. Curr HIV Res. 2016;14(2):165–71
 24. Zoufaly A, Onyoh EF, Tih PM, Awasom CN, Feldt T. High prevalence of hepatitis B and syphilis co-infections among HIV patients initiating antiretroviral therapy in the north-west region of Cameroon. Int J STD AIDS. 2012;23(6):435–8
 25. Akosua Adom Agyeman and Richard Ofori-Asenso, Prevalence of HIV and hepatitis B coinfection in Ghana: a systematic review and meta-analysis. AIDS Res Ther. 2016; 13:23.
 26. Sara A Healy, Sonia Gupta, and Ann J Melvin, 2013: *HIV/HBV coinfection in children and antiviral therapy*. Expert Rev Anti Infect Ther. 2013 11(3): 251–263.
 27. CNLS. Rapport *de progrès*. 2010.
 28. Laurent C, Bourgeois A, Mpoudi-Ngole E, Kouanfack C, Ciaf L, Nkoue N, et al. High rates of active hepatitis B and C co-infections in HIV-1 infected Cameroonian adults initiating antiretroviral therapy. HIV Med. 2010;11(1):85–9.
 29. Rusine J, Ondoa P, Asiimwe-Kateera B, Boer KR, Uwimana JM, Mukabayire O, et al. High seroprevalence of HBV and HCV infection in HIV-infected adults in Kigali, Rwanda. PLoS ONE. 2013;8(5):e63303.
 30. Kye-Duodu G, Nortey P, Malm K, Nyarko KM, Sackey SO, Ofori S, et al. Prevalence of hepatitis B virus co-infection among HIV-seropositive persons attending antiretroviral clinics in the Eastern Region of Ghana. Pan Afr Med J. 2016;25(Suppl 1):7.
 31. Diwe CK, Okwara EC, Enwere OO, Azike JE, Nwaimo NC. Sero-prevalence of hepatitis B virus and hepatitis C virus among HIV patients in a suburban University Teaching Hospital in South-East Nigeria. Pan Afr Med J. 2013;16:7
 32. Luetkemeyer A. Hepatitis B and HIV coinfection. <http://www.hivinsite.ucsf.edu/InSite?page=kb-05-03-04#S1X>. Accessed March 30th; 2016
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