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# *Seroprevalence of HBS AG and of Anti-HCV Antibodies among Children Born HIV Positive at the University Yaounde Teaching Hospital*

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## Abstract

***Background:*** *Infection with the Human Immunodeficiency Virus (HIV) is responsible for the terminal stage of Acquired Immunodeficiency Syndrome (AIDS), which was a latent infection until the introduction of antiretro-viral treatment. The progression to chronicity of this infection leads to chronic inflam-mation that facilitates the occurrence of opportunistic infections. Cameroon is a country located in sub-Saharan Africa, area En-demic to the viral infection, there is very little data on the Herpes Virus Infections Epidemiology, Especially Associated with HIV Infection with HIV-positive people born HIV positive with an undetectable viral load. Objective: The aim of our study was to determine the seroprevalence of HBs antigen and Anti-HCV antibodies in HIV-positive children born HIV posi-tive in Yaoundé.*

***Methods:*** *It was a prospective cross-sectional study, conducted at the Yaounde University Teaching Hospital (YUTH) after 12 months of follow up, in children living with HIV born HIV positive, on antiretro-viral treat-ment and whose medical file was complete and available within the Approved treatment Center (ATC). IgG an-tibodies against HCV (Anti-HCV antibody) and HBs antigen (HBs Ag) were qualitatively determined by Rapid Diagnostic Tests, for the detection of these pathogens. Data en-try and analysis was done using the Statistical Package for Social Sciences (SPSS) version 22.0, the Fischer exact, the Khi-square and the Mann–Whitney tests. P-values less than 0.05 were considered statistically significant.*

***Results:*** *A total of 74 participants were enrolled in the study with a female predominance of 68.92% (n=51/74). The average age of our series was 9.05±5.09 years with a range of 3 to 19 years, and most participants was under 10 years old (56.76%, n=42/74). HBsAg and anti-HCV Ab the sero-prevalence were 18.92% and 14.2 %. Other parameters such as sex, age, stage of disease, smoking and alcohol consumption were not associated with the seropositivity of these viruses.*

***Conclusion:*** *It was strong to note a circulation of those viruses in HIV infected patients, mainly in bi and tri co-infections.*

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## Abbreviations

**AIDS:** Acquired Immunodeficiency Syndrome
**ATC:** Approved Treatment Center
**HBs-Ag:** Hepatitis B Surface Antigen
**HBV:** Hepatitis B Virus
**HCC:** HepatoCellular Carcinoma
**HCV:** Hepatitis C Virus
**HIV:** Human Immunodeficiency Virus
**PLHIV:** People Living Human Immunodeficiency Virus

## Introduction

It is estimated that two billion people have been infected with Hepatitis B Virus (HBV) worldwide, of which 350 million are chronic carriers and can transmit the virus for years. The overall preva-lence of HBV infection in people living HIV (PLHIV) was 10.5% [1]. The virus is ineffective and causes approximately 500.000 deaths per year. In developing countries (in Sub-Saharan Africa, in much of Asia and the Pacific) more than 7% of HIV-infected. In 2004, the seroprevalence of Hepa-titis C Virus (HCV) infection in the general population was 6.5% [2] and the overall prevalence of HCV infection in PLHIV 1.3%Vwas in Cameroon [3]. It is known that there is no doubt the faster progression rate of fibrosis in cases of HBV-HIV and HCV-HIV coinfection [4] and the increased frequency of cirrhosis, hepatic decompensations, hepato Cellular Carcinomas (HCC) and higher mortality rates related to liver diseases [5,6]. The overall prevalence of HCV infection in PLHIV was 5.4% in Africa [1]. Coinfection rates vary significantly, and parameters such as geographical region and population categories represent the main risk factors. Taking into account of this datas, World Health Organization (WHO) recommends systematic screening for HBV and HCV in people living in resource-limited areas [7]. This prompted the WHO to establish a global strategy for the elimination of viral hepatitis which aims to reduce the number of new infections, and deaths and increase by 80% the proportion of people treated by 2030 [8]. The overall prevalence of HBV/HCV coinfection in PLHIV was 0.7% [1]. In Cameroun, according to the HIV prevalence survey carried out in 2023, the general population was 2.7 %. In 2016, Cameroon implemented the" test and treat" policy [9]. However, the extent of HIV co-infection with hepatitis B and C viruses in people born HIV-positive to HIV-positive mothers is unknown, lack of standard guidelines the survey as well as legal issues has being a major challenge is predictor poor prognostic. The present study aimed to determine the seroprevalence of HBsAg and Antibody anti HCV but also than their co-infection with Human Immunodeficiency Virus among children born HIV positive followed at the Yaounde University Teaching Hospital (YUTH).

## Materials and Methods

### Study Design

A cross-sectional study was carried out from November 2020 to October 2021 during 12 months within at the Approved Treatment Center (ATC) of Yaounde University Teaching Hospital (YUTH).

Sample Size Calculation: The calculation of this sample size was made using the prevalence of HCV, which are 5.3 % in Cameroon [1], The prevalence of HBV, which are in Cameroon is 10.5% [1]. We used the following formula [12]:

$$n = \frac{P(1-P)(Z_{1-\alpha})^2}{i^2}$$

Z = the level of statistical significance with a 95% confidence interval (CI) of 1.96; i= the level of precision of 0.05; P = The proportion of patients estimated to be infected by HBV and HCV.

Given that the study was conducted during the COVID pandemic, during which patients were hesi-tant to come to the hospital or even participate in a study, we were unable to reach the calculated sample size. Consequently, we decided to conduct a non-probabilistic sampling and consecutive.

### Data Collection

Each participant had to sign a consent form before enrollment. A questionnaire was then adminis-tered, and a blood sample was collected and sent to the Microbiology Laboratory of the Faculty of Science, located in the Central Region of Cameroon, at the University of Yaounde I which served as the site for biological analysis of the samples. Demographic data (age and sex) and clinical infor-mation were collected. Missing information during the interview could be completed using the medical record. The study was approved by the ethics committee of the Central Region of Came-roon under reference N/Ref: (N°0082/CRERSHC/2023) and another ethical clearance was obtained from the hospital management and ethical committee under reference N/Ref (N°494/ AR/CHUY/DG/ DGA/CAPRC).

### Study Population and Eligibility

A total of 74 participants were included in the study. Exclusion criteria included being born HIV-positive with an HIV-positive mother on ART; having an undetectable viral load at the time of inclusion in the study (< 50 copies of RNA/µl); giving assent for adolescents aged 12 to 20 years; obtaining parental consent for children aged 0 to 20 years; giving informed consent for individuals aged 21 years and older.

### Prélèvement Des Echantillons Et Analyses De Laboratoire

Blood sampling was performed from the veins in the antecubital fossa, and blood samples were collected in dry tubes without anticoagulant. Subjects were invited to fast for at least 8 to 12 hours before collection(12).

**Serology of HBV:** HBsAg, HBeAg and Ab anti-HBs, Ab anti-HBe, Ab anti-HBc IgG antibody de-tection was performed on serum samples using the One Site HBV- 5 Rapid Test (HBV 5in 1 Comb-test (S/P) (Nantong, Diagnos Biotechnologyco., China) according to the manufacturer's instruc-tions.

**Serology of HCV:** IgG rapid diagnostic test for Biolin-specific antibodies: HCV-specific IgG an-tibody detection was performed on serum samples using the One Step Rapid Test HCV AB Test Cassettes (S/P) (Hightop Boitech, China) according to the manufacturer's instructions.

### Analyses Statistis

Data curation were made with Excel 2019 and analyses were performed with the statistical software SPSS, version 22.0 (SPSS, Chicago, Illinois, USA). P value of less than 0.05 was considered statis-tically significant.

## Results

### Sociodemographic

A total of 74 participants, including 23 boys (26.6%) and 51 girls (73.4%), were included in this study, resulting in a sex ratio of 0.45. The average age of our patients was 9.05±5.09 years.

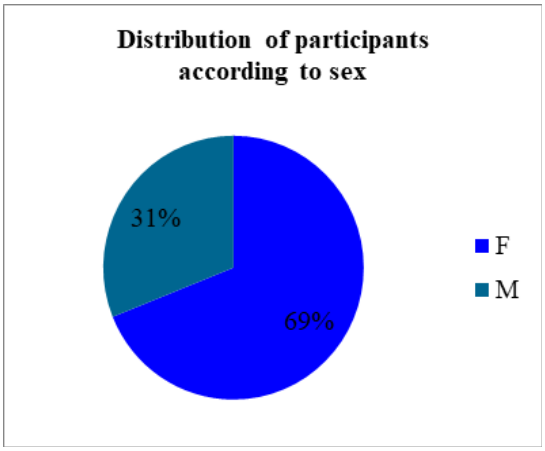


**Figure 1:** Distribution of participants according to sex

### Prevalence of Smoking

The 74 participants included had ages ranging from 3 to 19 years. The average age within the study was 9.054 ± 5.096 years. Figure 2 below shows that the most represented age group was [5-10[, ac-counting for 33.78% (n=25). Based on the classification proposed by the WHO (2014) [13], which states that a person is considered a child if they are between 0 to 14 years old and an adolescent if they are between 15 to 19 years old, it appears that children were the most affected at 56.76% (n=42 children) with ages ranging from 0 to 9 years, compared to 43.24% of adolescents (n=32) whose ages ranged from 10 to 19 years. (Figure 2)

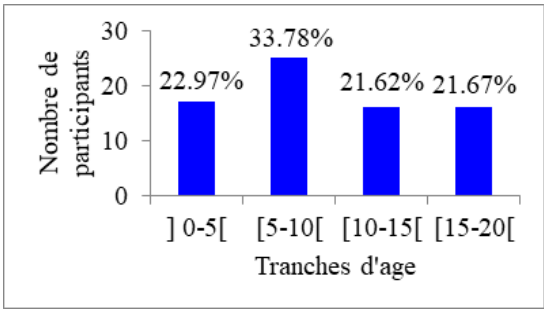


**Figure 2:** Distribution of participants according to age

## Parameters Serologies

Prevalence of Human Immunodeficiency in the Population of Study

The prevalence of co-infection of HIV-1/-2 was 00 %. A total of 74 participants included, 69 in-fected to the HIV-1 for a global prevalence of 93.59 % and 4 infected by HIV-2 for a global preva-lence of 5.41% (Table 1). Among 51 girls and 23 boys included, it indicates a feminization of the infection (66.7% (n=53%)) about to boys (30.437%); p 0.05. be it for HIV-1 or for HIV-2, higher majority of the infected population (78.26%) found in range age included between 3 to 14 years (Table 2).

**Table 1:** Gender and Age Wise Distribution of Ag-HBs and Ab Anti-HCV

| Parameters n(%) | HBsAg+ | Ab anti-HCV+ | HBsAg+ and Anti-HCV Ab + | Without -HBsAg+ and anti-HCV Ab + |
|---|---|---|---|---|
| **Sexe** | | | | |
| Grils(51) | 8(15.68) | 5(9.8) | 0(0) | 38(74.5) |
| Boys(23) | 5(21.74) | 1(4.3) | 1(4.3) | 16(69.6) |
| **Age group (years)** | | | | |
| ]0-5[ (17) | 6(35.3) | 0 | 0 | 11(64.71) |
| [5-10[ (25) | 2(8) | 3(12.9) | 0 | 20(80) |
| [10-15[ (16) | 4(25) | 1(6) | 0 | 11(69) |
| [15-20[ (16) | 2(12.5) | 3(18.8) | 1(6) | 10(62.5) |
| **Total 74 (100%)** | | | | |

## Years Wise Distribution of HBsAg and anti-HCV Ab and Risks Factors

The study identified several key factors occurring the infection hepatitis B and C. The most promi-nent factor was a tobacco intake (24.32%), reflecting a strong sense of purpose and commitment to addressing the infection hepatitis C in PLHIV as burden. Additionally, Alcohol consumption played a notable role, with 22.96% of HIV-infected with HBs-Ag citing its influence

**Table 2:** Years Wise Distribution of HBsAg and Anti-HCV Ab and Risks Factors

| Age group (years) | n (%) | Alcohol consumption n (%) | HBsAg | Anti-HCV Ab | Tobacco intake n (%) |
|---|---|---|---|---|---|
| ]0-5[ | 17 (22.97) | 0 | 6(35.3) | | 0 |
| [5-10[ | 25 (33.78) | 0 | 2(8) | 3(12.9) | 0 |
| [10-15[ | 16 (21.62) | 3 (4.05) | 4(25) | 1(6) | 9 (12.16) |
| [15-20[ | 16 (21.62) | 14 (18.91) | 2(12.5) | 3(18.8) | 9 (12.16) |
| **Total 74 (100%)** | | | | | |

## HBV and HCV Infection in Function to the Immune Statut

When evaluating the association between infection and immune status, no significant difference was observed ($p>0.05$). Thus, immune status in terms of CD4+ counts have a significant impact on the occurrence of HBV infection.

However, the distribution of infected patients HBV and HCV based on clinical signs and CD4+ T-cell counts shows that the vast majority of patients presenting clinical signs are those with com-petent immune systems, with 59.42% (n=41) having CD4+ T-cell counts ranging from [500-1600[, with a statistically significant difference ($p<0.05$) compared to those with CD4+ T-cell counts < 500 cells/mm3. Despite the subjective nature of patient history, the most common clinical sign is cold sores (10.4%). (Table 4)

**Table 3:** Distribution of HBV and HCV Seropositive Patients by the Rate of CD4 Count

| Classe de lymphocytes T CD4+ (cellules/mm3) | HBsAg n(%) | Anti-HCV Ab n(%) | HBsAg+ and Ab anti-HCV+ n(%) | Number (%) |
|---|---|---|---|---|
| [500-1600] | 8 (17.8) | // | 5 (11.11) | 45 (60.8) |
| [350-499] | // | 1(50) | // | 2(2.7) |
| [200-349] | 4 (16.7) | // | 1 (4.2) | 24 (32.4) |
| ] 0-200[ | 1(33.33) | // | // | 3 (4.1) |

## Discussion

To the best of our knowledge, this manuscript is the first to address the synthesis of data on risks factors due to HBV and/or HCV coinfection in PLHIV in Cameroon. Our work is also an update of data on HBV and/or HCV coinfection in PLHIV in Yaounde-Cameroon. The objective was to de-termine the prevalence of HBsAg+ and HCV-Ab among children born HIV positive at the Yaounde University Teaching Hospital. Hepatitis B is really a global public health problem [12]. In our study, we found 18.92 % of the HBsAg positive porters (n=60). The prevalence of 18.92% determined in the present work is higher than of regional data obtained in a recent global review (10%) [14] and a previous study conducted in sub-Saharan Africa (15%) [6] but also in the systematic review in Africa that was 10.5% [1]. Additionally, the high seroprevalence of HBV in this study may be explained by the diminution of their immunity due to the infection by HIV-1 that promote the transmission and the chronic car-rier of HCV and HBV [15]. The overall prevalence of HCV among PLHIV in this study was 9.46 %. This HCV prevalence is very higher than of the general African population estimated at 5.3% [1] and a study from Chad in 2014 was 2%. This low prevalence of HCV found in this study confirm that, contrarily to HBV and HCV that have the same route of transmission, the HCV cannot be transmitted by sexually route but by sanguin route. The overall prevalence of HBV and HCV coin-fection among PLHIV in the present study was 0.1%. This result suggests that to prevent HBV in-fections, PLHIV should use ARV early. The sustainability and/or strengthening of the protection of newborns through

vaccination programs remains crucial for reducing mortality from HBV and/or HCV coinfections in PLHIV. In a méta-analyse, it indicated that the relative risk of being HBsAg carrier in HIV-infected patients compared to HIV-negative patients 1.40. [16]. Zoulim described equally that both of two viruses have de same route of transmission but HBV is 50 to 100 times more infectious than HIV [17]. Contrarily to those data, another authors from Africa reported that people living with HIV had not of important risk of seropositivity to HBV and HCV compared to HIV-negative patients. 70 Children were detected positive of HIV-1 (94.6 %) versus 4 Children were detected positive of HIV-1 (5.4%). This seroprevalence is lower than that found in 2014 in the study of Bes-simbaye et al. against 0.2% of HIV-2. Isolated cas of HIV-2 observed in our study maybe to explain by the movement of people from area ecologic of HIV to another. Additionally, its to confirm that it's the type 1 that prevail in Central Africa and Cameroon in particular [18]. The present work shows numerous limitations, namely the cross-sectional type of the study, however, did not allow conclusions to be drawn on the causal links with the associated factors identified. The hepatitis B viral load was not carried out in our patients. The small sample size which does not allow the re-sults of this work to be generalized. And short duration of the study do not provide sufficient statis-tical power to generalize the results of this study to all pregnant women at the Yaoundé University Hospital. The seroprevalence obtained without using molecular techniques. The small number of risk factors considered in this work. However, the present work showed strengths such as high-lighting the prevalence of HBsAg in pregnant women.

## Conclusions

Our study had demonstrated that despite taking ARV, and no HIV viral load, viral co-infections ap-pear. In our study, that objective was to determine the prevalence of HBs-Ag and Anti-HCV Anti-bodies among children born HIV positive at the Yaounde University Teaching Hospital. This study highlighted a high risk of herpesvirus infections among PLHIV born HIV positive, in ages ranging from 3 to 19 years, especially among women. The seroprevalences of these viruses were low and their association with children clinical profile highlights their risk factors. The prevalence of these viruses demonstrates their high endemicity in Cameroon.

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## Author Contributions

Mbongué-Mikangué .C. André designed and set up the research project, collected the samples. led the technical aspects at the Hematology Laboratory. The analysis of the data and the writing of this article.

## Funding

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## Data Availability Statement

The data supporting the results of this study are available on request from the corresponding author. The data is not publicly available because it contains information that could compromise the con-fidentiality of research participants.

## Conflicts of Interest

The author declare no conflict of interest.

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