

Helicobacter pylori infection in hepatitis B virus carriers in Cotonou: epidemiology and socio-demographic factors associated with the co-infection

Abstract

Introduction: Infections with hepatitis B virus (HBV) and *Helicobacter pylori* (*H. pylori*) are two major public health issues in the world in general, and in Benin in particular. This study aimed to determine the prevalence of *H. pylori* infection and the socio-demographic factors associated with the co-infection in chronic HBV carriers in Cotonou.

Methods: This cross-sectional descriptive and analytical study was conducted in the hepatogastroenterology department of the CNHU-HKM from May to August 2017. We included all patients aged 15 years or older, carriers of HBs Antigen (Ag) who were admitted in that period. Detection of *H. pylori* was done by looking for *H. pylori* Ag in their stool.

Results: Among the 121 patients who were positive for HBs Ag (mean age 42.3 ± 11.6 years, sex-ratio 2.26), 70 (57.9%) were also positive for *H. pylori* Ag test in the stool. The level of education was often high (61%), and the socio-economic level was medium for 80 patients (66%). Most lived with more than 2 people under the same roof (an average of 3.15 people) and 54 (44.6%) were in a household of more than 4 people.

No socio-demographic factor was significantly associated with *H. pylori* infection in HBs Ag carriers: whether it was their age ($p = 0.18$), their gender ($p = 1$), their educational level ($p = 0.52$), the number of people living under the same roof ($p = 0.45$) or their socio-economic level ($p = 0.81$).

Conclusion : The prevalence of *H. pylori* in patients with HBs Ag is relatively high, but appears to be lower than in the general population. However, among these adults, socio-demographic factors seem to play a minor role in the occurrence of the co-infection.

Keywords: Hepatitis B, *Helicobacter pylori*, co-infection, prevalence, associated factors

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Introduction

Infections with hepatitis B virus (HBV) and *Helicobacter pylori* (*H. pylori*) are two major public health issues in the world in general and in Benin in particular.¹ Indeed, their respective prevalences in Benin are 9.9%² and 74%.³

H. pylori is a bacterium that colonizes the gastric mucosa and is responsible for gastritis, peptic ulcer disease, as well as gastric adenocarcinoma and malt lymphoma.⁴ Recent studies showed that *H. pylori* infection is associated with the progression of diseases other than gastrointestinal diseases. This includes hematological, cardiovascular or autoimmune diseases, chronic bronchitis and coronary sclerosis,⁴⁻⁶ but also liver's diseases.⁷ *H. pylori* DNA could be detected in liver samples from patients with chronic liver disease, suggesting that coexistence with *H. pylori* could worsen a patient's condition.⁸ Likewise, a case-control study, done in China by Ponzetto A et al.⁹ in the 2000s, found a high prevalence (89%) of *H. pylori* in patients with HVB-related cirrhosis compared to 59% in studies conducted on non-cirrhotic patients. In their study on patients with different stages of liver disease, Huang et al.⁴ showed that the rate of *H. pylori* infection increased with the progression of the liver disease. They also noted that the infection was associated with the

immunopathological disorders and the immunological tolerance of the patients with liver diseases.⁴

No previous study in Benin has been reported concerning HBV and *H. pylori* co-infection. The objective of this study is to determine the prevalence of *H. pylori* infection in patients with CHB and to analyze the factors associated with this co-infection.

Methods

Our study was a cross-sectional, descriptive and analytical study with a prospective data collection. It took place over a 4 months period, from May to August 2017, in the Hepato-gastroenterology Clinic of the National University Hospital Hubert Koutoukou Maga (CNHU-HKM) of Cotonou. We included subjects who were at least 15 years old, HBs Ag carriers, and who gave their verbal consent to participate in the study. Patients who received antibiotics less than a month prior to the inclusion date and / or a Proton Pump Inhibitor (PPI) less than 2 weeks were not included in the study.

Socio-demographic data were collected through an interview with each patient, followed by stool collection. The socio-demographic features were: age, gender, area of residence, level of education, socio-economic level, number of persons living under the same roof

and number of persons in the household. The *H. pylori* antigen search was then performed using *Helicobacter pylori* Antigen Rapid test Kit (Zhuhai.Encode Medical Engineering Co Ltd, China). Stool collection procedures, analysis and interpretation of results were in accordance with the instructions of the rapid test manufacturer.

Afterward, we recorded all the collected information, including the result of the rapid test, on a standardized form. The collected data was entered and statistically analyzed respectively with Excel 8.0 and SPSS 17.0 for Windows. Quantitative variables were expressed as mean ± standard deviation, when the distribution was normal and described using the median and the interquartile range for abnormally distributed ones. Chi-squared analysis or the Fischer's exact test were used for the variables' comparisons. A *p*-value <0.05 was considered statistically significant.

Results

Characteristics of the studied population

A total of 121 patients with chronic hepatitis B (CHB) were included. The male gender was predominant (84 males, 69.4%) with

a sex-ratio of 2.26. The mean age was 42.3±11.6 years (range: 18-74 years old). The modal age group was greater than or equal to 40 years (61/121). In this study, 93 (77%) live in urban areas. Overall, 111 (91.7%) patients were educated. 74 (61.1%) reached a high level of education. The socioeconomic level was considered medium in 80 (66.1%) patients, compared to 39 (32.2%) patients who had a low level. On average, there were 3 cohabitants per roof, and 54 (44.6%) out of 121 patients lived with at least 4 cohabitants under one roof.

Prevalence of *H. pylori* in the studied population

Out of the 121 patients with hepatitis B, 70 were also positive for *H. pylori* antigen, indicating a prevalence of 57.9%, with a 95% CI = [48.5; 66.8].

Factors associated with *H. pylori* -HBV co-infection

Data on the study of associated factors are summarized in Table 1. Considering the gender of the 70 patients with the co-infection, 49 (70%) were male compared to 21 (30%) who were female. Gender was not significantly related to *H. pylori* infection in HBV carriers (*p* = 1.00).

Table 1 Sociodemographic factors and association with *H. pylori* -HBV co-infection.

	Status		Univariate analysis		
	H. pylori+ n(%)	H. pylori- n(%)	OR	IC _{-95%}	p
Age (in years)					
≤19	1 (50%)	1 (50%)	-	-	0.18
20-29	6 (50%)	6 (50%)			
30-39	32 (69.6%)	14 (30.4%)			
≥40	31 (50.8%)	30 (49.2%)			
Sex					
Male	49 (58.3%)	35 (41.7%)	1.07	0.49-2.33	1
Female	21 (56.8%)	16 (43.2%)			
Origin					
Urban	52 (55.9%)	41 (44.1%)	0.71	0.29-1.69	0.52
Rural	18 (64.3%)	10 (35.7%)			
Number of cohabitants living under the same roof					
0-1	4 (28.6%)	10 (71.4%)	-	-	0.45
2-3	25 (47.2%)	28 (52.8%)			
≥4	22 (40.7%)	32 (59.3%)			
Level of education					
Secondary / University	61 (58.6%)	43 (41.4%)	1.26	0.45-3.53	0.83
Unschooling / Primary	9 (52.9%)	8 (47.1%)			
Socio-economic condition					
Medium / High	48 (57.1%)	36 (42.9%)	0.91	0.41-1.99	0.81
Low	22 (59.5%)	15 (40.5%)			

Furthermore, there was no association between the patient age and *H. pylori*-HBV co-infection (*p* = 0.18).

Although the percentage of patients with the co-infection, was higher in those living in rural areas compared to those living in

urban areas, the difference was not statistically significant ($p = 0.52$). The percentage of patients with *H. pylori* infection who had at least a middle or high school level (87.1%) was higher than those who attended only primary school (12.9%). However, there was no statistically significant relationship ($p = 0.83$) between the level of study and *H. pylori* infection in HBV carriers.

Also the number of subjects living under the same roof, as well as the socio-economic level were not significantly related to *H. pylori*-HBV co-infection (respectively $p = 0.45$ and $p = 0.81$).

Discussion

H. pylori infection can be diagnosed by both invasive and non-invasive methods. Diagnosis based on endoscopic biopsy is the gold standard. But the latter is invasive and is subject to sampling errors because *H. pylori* tends to be distributed heterogeneously in the stomach.⁴ The antigen research in the stool is a non-invasive, convenient, inexpensive test that can detect active *H. pylori* infections. It is based on the use of anti-*H. pylori* monoclonal antibodies. The sensitivity and specificity of this test are greater than 90%. It is convenient, provides fast results with a positive predictive value (PPV) of 97.1%, a negative predictive value (NPV) of 58% and an accuracy of 91.3%.¹⁰ These reasons promote why its application as a diagnosis test for *H. pylori* infection, especially countries with limited resources such as Benin. We used the antigen research test in our study.

In recent years, researchers have paid particular attention to the relationship between *H. pylori* infection and liver diseases, especially viral hepatitis.^{4,7} For these authors, infection with *H. pylori* would be more common in carriers of viral hepatitis and worsen the prognosis.

In our study, the prevalence of *H. pylori* among patients with chronic HBV was 57.9% (70/121). This prevalence appeared high but would probably be lower than that of our general population. Indeed, the study based on *H. pylori* serology, published in 2005 by Aguemon BD et al.³ mentioned a prevalence of 74% of *H. pylori* in general population. Furthermore a study of Kpossou R et al.¹¹ based on histology, reported a 71.5% prevalence of *H. pylori* in patients admitted at a digestive endoscopy unit at Cotonou from 2014 to 2015. We could therefore think of a decrease in the frequency of *H. pylori* infection. This decrease could be explained by the improvement of the living conditions and hygiene of the population, the use of antibiotics for the eradication of *H. pylori* which becomes more and more common. However, the observed differences in frequency could be also explained by the fact that the studied populations were different and the applied methods for *H. pylori* diagnosis were not the same.

Fan RQ and Wang C in 2012,¹² Huang J, et al. in 2015⁴ and Hao Q, et al. in 2017¹³ reported respectively 64.1%, 58%, and 63.9% of *H. pylori* infection among patients with chronic liver disease. These results are similar to those of this study. In contrast, Pogorzelska J, et al. in 2017¹⁴ in Poland, Ponzetto A, et al.⁹ in Italy noted higher prevalences, which were 67.7% and 89% respectively. This could be explained by the fact that the patients included in the two studies were carriers of HBV at a cirrhosis stage and therefore had an advanced chronic hepatitis B and probably a more collapsed immune system.

Our study found no significant difference between *H. pylori* infection and socio-demographic factors, including the gender of the patients ($p = 1$, OR = 1.07), their residence area ($p = 0.52$, OR = 1.71), their level of study ($p = 0.83$, OR = 1.26). This could be explained by the fact that infection with *H. pylori* occurs early in childhood. Actually, by the age of 10, more than 50% of children in developing

countries are already infected.¹⁵ In 2016, a study conducted at Cotonou, on 102 children from 2 to 18 years old (mean age = 7 years), found a prevalence of *H. pylori* at 46% (47/102). Factors associated with the presence of *H. pylori* infection were promiscuity and lack of hand hygiene compliance. In that study too, the infection was not related to sex ($p = 0.98$), age ($p = 0.83$) and children's ($p = 0.53$) or their mothers education level ($p = 0.19$).¹⁶ In contrast, Ding Z¹⁷ in China in 2015 reported a significant relationship between *H. pylori* infection and the area of residence as well as and between *H. pylori* infection and the socio-economic level. This could be explained by the high rate of cities' urbanization and the improvement of people's living conditions.

Conclusion

Our study showed that the prevalence of *H. pylori* infection is relatively high among HBV carriers, but this prevalence is lower than in the general population. It was not associated with any socio-economic or demographic factor. The age of acquisition of these two infections (preferentially in children) could explain these results. This hypothesis could be verified by a similar study in a pediatric population.

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Conflicts of interest

The author declares no conflicts of interest.

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