

# Helicobacter Pylori Infection: Epidemiological, Clinical and Endoscopic Aspects in Brazzaville

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## Abstract

**Introduction:** *Helicobacter pylori* infection is a real health problem worldwide. It is the most common chronic bacterial infection in the world, and is particularly prevalent in developing countries. **Objective:** To determine the frequency of *Helicobacter pylori* infection and to study the epidemiological, clinical and endoscopic characteristics associated with this infection in Brazzaville. **Patients and Methods:** This was a descriptive cross-sectional study conducted from January to November 2020, *i.e.* 11 months. This work focused on 100 symptomatic patients over 18 years old referred for upper GI endoscopy. Gastric biopsies for biological study by urease test and molecular study by real time PCR technique were taken. **Results:** With a mean age of  $46.32 \pm 15.20$  years, the frequency of *Hp* infection was 91%, with a female predominance of 53%. The *sex ratio* was 0.92. The average age was  $46.32 \pm 15.20$  years. Carriage of the infection was more important in households with more than 3 persons, in patients consuming public tap water and in those using both types of sanitary facilities. Endoscopy was indicated for epigastralgia in 93.1% of cases. About 56.14% of the infected patients had normal mucosa versus 12.28% with ulcerated lesions and 22.81% with gastritis. **Conclusion:** The prevalence of *Helicobacter pylori* infection is significant in Congo, justifying early detection in order to improve management.

## Keywords

*Helicobacter pylori*, Carriage, Chronic Gastritis, Gastric Ulcer, Brazzaville

## 1. Introduction

*Hp* infection is a real human health concern worldwide. It is the most common chronic bacterial infection, particularly in developing countries [1]. However, this prevalence can vary considerably, both between different countries in the world and even within a country, depending on the age and socio-economic conditions of the population [2]. Indeed, more than 50% of the world's population is thought to be infected and 20% - 90% of people are infected depending on the country, with infection being more common in poor and low socio-economic environments [3] [4] [5] [6] [7].

In Africa, several studies conducted from 2005 to 2019, place the prevalence of *Hp* infection between 60% and 91% [8] [9] [10] [11]. In Congo, several studies have investigated the frequency of *Hp* infection. Ibara *et al.* in 2005 reported a frequency of 48.7% in children [12]; Otsira Ngoyi *et al.* in 2015 estimated a frequency of 89% in adults [13]. Ngala Itoua-Ngaporo *et al.* in 2018 estimated that *Hp* occurs in up to 79.6% of the population [14] and the most recent by Otsira Ngoyi *et al.* in 2019 estimated the prevalence at 75.5% [15].

The mode and routes of transmission of *Hp* infection are known. Infection occurs mainly in childhood, via the oral or faecal-oral route. Factors influencing the incidence and prevalence are age, gender, geographical location, promiscuity, poor hygiene and low socio-economic status [16].

*Hp* infection has been implicated in a wide range of gastric mucosal diseases, such as acute and chronic gastritis, gastric ulcer, gastric cancer [16] [17].

The aim of this work is to improve the management of patients infected with *Helicobacter pylori* by studying the epidemiological, clinical and endoscopic features associated with *Hp* infection.

## 2. Patients and Method

This was a descriptive and cross-sectional study from January to November 2020, a period of 11 months. The study was conducted in the cities of Brazzaville and Pointe-Noire. The upper digestive endoscopy and biopsy samples were taken in three endoscopy centres in the city of Brazzaville, namely the Schnell Foundation Medical and Social Centre, the OCH Gastroenterology Medical Centre, and the Gastroenterology and Internal Medicine Department of the Brazzaville University Hospital. The molecular study was carried out at the Hugues Dieudonné Loemba (HDL) laboratory of the Fondation Marie Madeleine Gombes (FMMG) in Pointe-Noire. The study population consisted of all patients received for oesogastroduodenal endoscopy (EOGD), regardless of the indication, in one of the exploration centres during the study period. We included any consenting patient over 18 years of age, symptomatic patients and those with histologically confirmed gastric cancer. Patients who had taken a PPI and/or antibiotic in the month prior to endoscopy, patients in whom oesogastroduodenal endoscopy was incomplete and biopsy could not be performed, and patients in whom biopsies were not usable were excluded from the study. Our sample size was es-

estimated at 100 patients. Consecutive sampling of patients meeting the inclusion criteria was performed until the estimated number was reached. The study required the opinion of the Health Sciences Research Ethics Committee (N° 303/MRSIT/IRSSA/CERSSA).

The data were collected by the same investigator using a pre-established survey form. The form was used to collect information on the risk factors of contamination, *i.e.* socio-economic and epidemiological aspects, but also certain habits and lifestyle of the patients that could influence the frequency of *Hp* infection.

The digestive symptoms were dyspeptic syndrome, nausea, vomiting, digestive haemorrhage, type and location of abdominal pain. Upper GI endoscopy was performed using FUGINON video endoscopes in the Brazzaville University Hospital and Olympus® GIF V2, GIFQ 145 in the other centres, as well as accessory equipment that was carefully disinfected and sterilised before the examination according to SFED recommendations. During the examination, samples were taken with a single-use biopsy forceps from two sites: the antral mucosa and the fundic mucosa. For each site, two biopsy fragments of approximately 0.5 mm in diameter were taken. For each of the two sites, one fragment was taken for urease testing and one fragment for molecular biology. Biopsies for molecular study were cryopreserved, frozen at  $-32^{\circ}\text{C}$ .

The rapid urease test was performed in the endoscopy room immediately after the examination, using the Pronto Dry New, Cadrex test. This test allowed rapid detection of the bacteria based on its main property, urease production. The test was positive when the indicator (ring) with a yellow base gradually turns from pink to purplish red at room temperature.

The molecular study was carried out on fresh cryopreserved biopsies using the real-time PCR technique in two consecutive steps: DNA extraction using the “ReliaPrep™ gDNA tissue Miniprep system from Promega” and DNA amplification for *Hp* detection using the “Techne™ PrimePRO qPCR DNA detection Kit, H Pylori”.

### 3. Results

Of the 100 patients in our study population, 84 patients were positive by urease test and 91 by PCR. Based on our variable of interest, PCR, the overall frequency of *Hp* infection was 91% (Table 1). Our study population was predominantly female, 53% of the women were carriers of the bacteria. The mean age of the patients was  $46.32 \pm 15.20$  years with a peak of infection (32.97%) between 40 and 49 years (Figure 1). *Hp* infection was higher in patients with an average socio-economic status of 61.54%.

Regarding household size, the frequency of *Hp* infection was 86.9% for households with more than 3 persons. *Hp* infection was found in 59% of patients using tap water, 45% using modern toilets and 42% using latrines (Table 2).

Out of a total of 100 patients included in our study, 87 patients presented with abdominal pain. *Hp* was found in 92.5% of the patients with epigastric pain, 65%

**Table 1.** Frequency of infection according to the results of the two Hp tests in the study population.

VARIABLES	PCR		Total
	Positive	Negative	
Urease positive	79	5	84
Urease negative	12	4	16
Total	91	9	100

$p = 0.01$ .

**Table 2.** Distribution of infection by household size and living arrangements.

VARIABLES	PCR result		<i>p-Value</i>
	Positive (N = 91)	Negative (N = 9)	
	n (%)	n (%)	
<b>Household size</b>			
<3	11 (13.1)	7 (43.8)	<b>0.003</b>
3 - 7	60 (71.4)	8 (50)	0.09
>7	13 (15.5)	1 (6.2)	0.3
<b>Types of sanitary facilities</b>			
Latrines	42 (46.15)	6 (66.67)	0.2
Modern	45 (49.45)	3 (33.33)	0.3
Both	4 (4.40)	-	0.5
<b>Modern Water Source</b>			
Public tap	59 (64.84)	7 (77.78)	0.4
Mineral water	24 (26.37)	2 (22.22)	0.7
Well	3 (3.30)	-	0.5
*Other	5 (5.49)	-	0.4

of which was burning (Table 3). The frequency of *Hp* infection was higher in patients with nausea/vomiting followed by dyspeptic disorders, however, 74% of GI bleeding was related to *Hp*, and 81% of melenas presented by patients were related to *Hp*. All patients included in the study had undergone upper GI endoscopy. Endoscopy was normal in 70% of the patients, and revealed pathological mucosa in 30% of the patients. Endoscopy was indicated for epigastralgia in 93.1% of cases. It revealed normal mucosa (56.14%), ulcerated lesions (12.28%) and gastritis (22.81%) in infected patients. The bacterium was exclusive in acanthosis (100%) and frosted lesions (100%). This result is shown in Table 4 & Table 5.

#### 4. Discussion

*Considered the only carcinogenic bacterium to date, Hp infection is a major*

public health concern in developing countries. The aim of this study was to investigate the epidemiological, clinical and endoscopic factors associated with *Hp* infection.

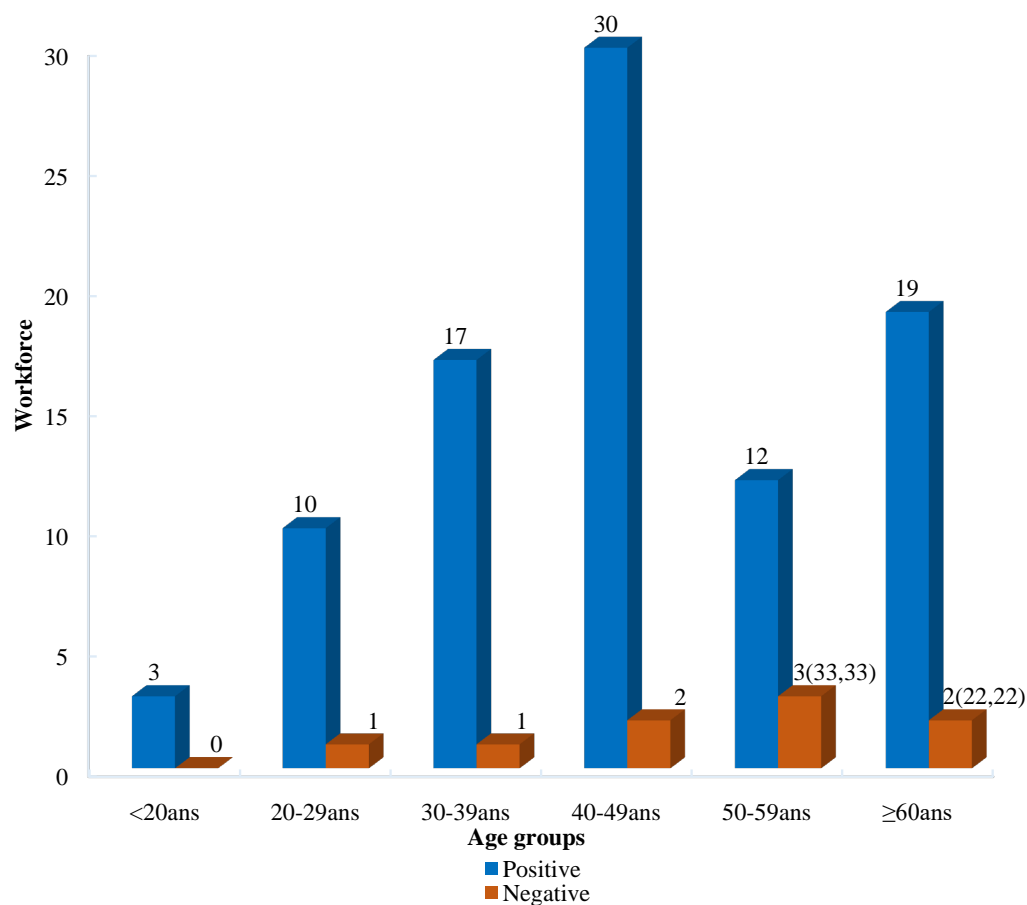


Figure 1. Age distribution of infection.  $p = 0.567$ .

Table 3. Distribution of infection according to the nature of the pain.

VARIABLES	PCR result		<i>p</i> -Value
	Positive (N = 91)	Negative (N = 9)	
	n (%)	n (%)	
<b>Location of pain</b>			
Epigastrium	74 (92.5)	8 (100)	0.4
Right hypochondrium	2 (2.5)	-	0.6
Available at	4 (5.0)	-	0.5
<b>Type of pain</b>			
Burn	52 (65)	3 (42.86)	0.2
Cramp	25 (31.25)	4 (57.14)	0.1
Vice	1 (1.25)	-	0.7
Not specified	2 (2.50)	-	0.6

**Table 4.** Distribution of infection according to symptoms.

VARIABLES	PCR result		<i>p-Value</i>
	Positive (N = 91)	Negative (N = 9)	
	n (%)	n (%)	
<b>Digestive symptoms</b>			
Nausea	34 (25.19)	4 (17.39)	0.6
Early feeling of fullness	29 (21.48)	5 (21.75)	0.1
Feeling of fullness in the stomach	22 (16.30)	4 (17.39)	0.1
Vomiting	30 (22.22)	3 (13.04)	0.9
Hematemesis	7 (5.19)	4 (17.39)	<b>0.0007</b>
Méléna	13 (9.62)	3 (13.04)	0.1

**Table 5.** Distribution of infection according to endoscopy findings.

VARIABLES	PCR result		<i>p-Value</i>
	Positive (N = 91)	Negative (N = 9)	
	n (%)	n (%)	
<b>Endoscopic aspects of patients</b>			
Normal mucosa	64 (56.14)	6 (37.5)	0.8
Ulcerated lesion	14 (12.28)	3 (18.75)	0.1
Budding lesion	3 (2.63)	2 (12.5)	<b>0.01</b>
Frosted lesion	1 (0.88)	-	0.7
Erosive aspect	12 (10.53)	1 (6.25)	0.8
Congestive aspect	14 (12.28)	1 (6.25)	0.7
Infiltrated appearance	1 (0.88)	2 (12.5)	<b>0.0003</b>
Acanthosis lesion	2 (1.75)	-	0.6
*Other	3 (2.63)	1 (6.25)	0.2

Two identification techniques (urease and PCR) were used to assess the carriage of *Helicobacter pylori* infection in the study population. Of the 100 patients in our study population, 84 were urease positive and 91 were PCR positive. Some patients (11) were urease negative and PCR positive. The high frequency of *Helicobacter pylori* by PCR demonstrates the improved sensitivity of PCR and the limitation of the urease technique which can only detect secreting strains. Furthermore, there was a statistically significant difference between these two tests ( $p = 0.01$ ). The variable of interest being the PCR, the frequency of *Helicobacter pylori* infection was 91%. This frequency was higher in women (53%). Aguemon *et al.* in Benin and Bommelaer *et al.* in France also reported a female predominance of infection [8] [18], while ATTAF N *et al.* in Morocco and Ould Bouh *et al.* in Mauritania reported a male predominance [19] [20].

All age groups were affected, with a higher frequency in younger patients, par-

ticularly those under 50 years of age, with a peak between 40 and 49 years of age (32.97%). No significant difference was found between age and *Hp* infection ( $p = 0.567$ ). This result is similar to those reported by some studies in Africa, which found no significant difference between the presence of *Hp* and age [8] [9] [21].

*Hp* infection was higher in patients with an average socioeconomic status of 61.54%. This result is similar to that obtained by Bagny *et al.* in Togo who obtained a higher frequency of *Hp* infection in the middle socio-economic class in 63.3% of cases [22]. On the other hand, Ankouane *et al.* in Cameroon and Ilboudo *et al.* in Burkina Faso obtained a frequency of 73.9% and 77.9% respectively in patients with a low socio-economic level [21].

Regarding patients' lifestyle, our results showed that regardless of household size or lifestyle, these factors were not directly related to *Hp* infection. However, a higher tendency of infection was observed in patients using tap water (59%) compared to those using other water sources. This result can be explained by the fact that more than half of the Congolese population uses this water source. This result can be explained by the fact that more than half of the Congolese population uses this source of water, as reported by Aguemon *et al.* in Benin [8] who found an association between *Hp* infection and latrine use.

Of the 43.86% of *Hp*-positive patients with abnormal endoscopy, a statistically significant difference was observed with patients with infiltrated ( $p = 0.0003$ ) and budding ( $p = 0.01$ ) lesions. Carriage of *Hp* infection was exclusive in acanthosis (100%) and frosted lesions (100%). In addition, *Hp* was strongly implicated in the occurrence of gastric ulcers, accounting for more than 80% of ulcers.

## 5. Conclusion

*Helicobacter pylori* occur at a frequency of 91% in the Brazzaville population. This study also showed that certain epidemiological factors such as the patients' lifestyle, including promiscuity, tap water consumption, and the use of latrines and sanitary facilities were associated with the occurrence of *Hp* infection. Epigastric pain, dyspeptic disorders and digestive bleeding were the symptoms experienced by *Hp*-infected patients. Although the mucosa was normal in most cases, the lesions identified were ulcers, gastritis, and ulcerative and frosted lesions. The search for *Hp* should be routine in cases of suspected *Hp* infection, and improve the management of *Hp*-infected patients.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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