

Frequency of Helicobacter Pylori Infection in A Gastroenterology Outpatient Clinic in Brazzaville

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1. Abstract

1.1. Introduction

Helicobacter pylori (*H. pylori*) infection is a major public health issue in sub-Saharan Africa. The aim of this study was to determine the frequency of this infection and to identify the factors associated with it among patients attending a gastroenterology outpatient clinic in a private facility in Brazzaville.

1.2. Patients and Methods

This was an analytical cross-sectional study conducted over a 24-month period, including 799 adult patients consulting for upper gastrointestinal symptoms. A stool antigen test for *H. pylori* was performed in all patients. Sociodemographic, environmental, clinical and endoscopic variables were analysed. Univariate analysis followed by multivariate logistic regression was performed.

1.3. Results

The overall frequency of *H. pylori* infection was 37.0% (296/799). The sex ratio was 1.06. The mean age was 41.3 ± 14.7 years. The predominant clinical manifestations were abdominal pain (76.6%) and dyspepsia (61.2%). At endoscopy, erosive gastropathy (27.3%) and congestive gastropathy (22.0%) predominated. In multivariate analysis, the factors independently associated with infection were poor hygiene conditions (aOR = 2.14; 95% CI: 1.52–3.01; $p < 0.001$), low socioeconomic status (aOR = 1.87; 95% CI: 1.31–2.67; $p < 0.001$), household overcrowding (aOR = 1.72; 95% CI: 1.22–2.43; $p = 0.002$), absence of handwashing (aOR = 1.68; 95% CI: 1.21–2.33; $p = 0.002$), use of pit latrines (aOR = 1.45; 95% CI: 1.03–2.05; $p = 0.034$) and consumption of well or spring water (aOR = 1.39; 95% CI: 1.01–1.92; $p = 0.045$).

1.4. Conclusion

The frequency of *H. pylori* infection remains high in Brazzaville and is strongly correlated with socio-environmental conditions. Collective hygiene measures and improved access to safe drinking water are needed.

2. Introduction

Helicobacter pylori (*H. pylori*) infection is one of the most widespread chronic bacterial infections in the world, affecting approximately half of the global population [1]. Its prevalence varies considerably according to geographical region, socioeconomic conditions and hygiene practices, ranging from 70 to 90% in low- and middle-income countries to 30 to 40% in industrialised countries [1,2].

In sub-Saharan Africa, the infection remains endemic, with a prevalence that may exceed 70% among symptomatic adults [3,4]. This bacterium, classified as a group I carcinogen by the World Health Organization, is implicated in the pathogenesis of several gastroduodenal disorders: chronic gastritis, peptic ulcer disease, MALT lymphoma and gastric adenocarcinoma [5,6].

In Congo-Brazzaville, available data on *H. pylori* infection come mainly from university hospital-based studies, with widely variable prevalences depending on the diagnostic method used [7,8]. Data from the private sector, where an increasing share of the urban population seeks care, are scarce, even though socio-environmental determinants in this setting are specific.

The aim of our study was to determine the frequency of *H. pylori* infection and to identify the sociodemographic, environmental, clinical and endoscopic factors associated with it among patients

seen in a gastroenterology outpatient clinic in a private facility in Brazzaville.

3. Patients and Methods

3.1. Study Design and Setting

This was an analytical cross-sectional study conducted over a 24-month period in the gastroenterology unit of a private clinic in Brazzaville, capital of the Republic of Congo.

3.2. Eligibility Criteria

We included all patients aged 18 years or older consulting for upper gastrointestinal symptoms (epigastric pain, dyspepsia, gastro-oesophageal reflux, vomiting, gastrointestinal bleeding, hiccups), who agreed to participate in the study and underwent stool antigen testing for *H. pylori*. Patients were not included if they had received *H. pylori* eradication therapy, proton-pump inhibitors, antibiotics or bismuth salts within the four weeks preceding consultation, or if their data were incomplete.

3.3. Study Variables

Data were collected using a standardised case-report form comprising the following variables:

Sociodemographic variables: sex, age, occupation (civil servants, students, unemployed, pupils, traders, housewives), socioeconomic status (low, medium, high).

Risk factors and hygiene conditions: hygiene conditions rated as good or poor; household overcrowding (yes/no); source of drinking water (tap, spring, mineral water, well); type of latrine (flush, pit); household size (small ≤ 4 persons, medium 5–7, large ≥ 8); handwashing practice (yes/no).

Clinical variables: abdominal pain, dyspeptic syndrome, gastro-oesophageal reflux disease (GORD), vomiting, gastrointestinal bleeding, hiccups.

Biological variable: detection of *H. pylori* stool antigen using a rapid immunochromatographic test.

Endoscopic variables: normal appearance, erosive gastropathy, congestive gastropathy, gastric or duodenal ulcer, bulbopathy, peptic oesophagitis, gastroduodenal ulceration.

3.4. Statistical Analysis

Data were entered into Microsoft Excel 2019 and analysed using SPSS version 25.0. Qualitative variables were expressed as counts and percentages, and quantitative variables as means $\pm$ standard deviations. Pearson's chi-square test or Fisher's exact test were used for the comparison of proportions. Binary logistic regression was performed as a multivariate analysis, including all variables associated with infection in univariate analysis with $p < 0.20$. Results were expressed as adjusted odds ratios (aOR) with 95% confidence intervals (CI). The threshold of statistical significance was set at $p < 0.05$.

4. Results

4.1. Frequency of Infection

Of the 799 patients included, the *H. pylori* stool antigen test was positive in 296 patients, corresponding to an overall frequency of 37.0% (95% CI: 33.7–40.4).

4.2. Sociodemographic Characteristics

The mean age of the patients was 41.3 ± 14.7 years, with extremes of 18 and 82 years. The male-to-female sex ratio was 1.06. Patients aged 20–39 years were the most represented (42.8%). Sociodemographic characteristics and the frequency of infection in each subgroup are shown in Table I.

Table I : Distribution of patients by sociodemographic characteristics and frequency of *H. pylori* infection ($n = 799$).

Variable		n	%	Hp + (%)
	Sex			
Male		412	51.6	40.3
Female		387	48.4	33.6
	Age group (years)			
< 20		58	7.3	27.6
20–39		342	42.8	39.8
40–59		286	35.8	38.1
≥ 60		113	14.1	30.1
	Occupation			
Civil servants		178	22.3	31.5
Students		112	14.0	34.8
Unemployed		143	17.9	44.8
Pupils		67	8.4	29.9
Traders		131	16.4	41.2
Housewives		168	21.0	39.3
	Socioeconomic status			
Low		356	44.6	45.5
Medium		312	39.0	33.7
High		131	16.4	24.4

4.3. Environmental and Hygiene Factors

Poor hygiene conditions were found in 478 patients (59.8%), household overcrowding in 467 (58.4%) and absence of handwashing in 376 (47.0%). These data are detailed in Table II.

4.4. Clinical Manifestations

Abdominal pain was the most frequent reason for consultation (76.6%), followed by dyspeptic syndrome (61.2%) and gastro-oesophageal reflux (35.9%). Gastrointestinal bleeding was rare (6.8%). Details are given in Table III.

4.5. Endoscopic Findings

Upper gastrointestinal endoscopy was performed in all patients. The predominant endoscopic lesions were erosive gastropathy (27.3%) and congestive gastropathy (22.0%). A normal endoscopic

appearance was found in 17.8% of patients (Table IV).

4.6. Univariate Analysis

In univariate analysis, the variables significantly associated with *H. pylori* infection were male sex, low socioeconomic status, poor hygiene conditions, household overcrowding, consumption of well or spring water, use of pit latrines, large household size, absence of handwashing and the “unemployed” occupational status (Table V).

4.7. Multivariate Analysis

After adjustment by multivariate logistic regression, six factors remained independently associated with *H. pylori* infection: poor hygiene conditions, low socioeconomic status, household overcrowding, absence of handwashing, use of pit latrines and consumption of well or spring water (Table VI).

Table II. Distribution of patients by hygiene and environmental factors (n = 799).

Variable	n	%	Hp + (%)
Hygiene conditions			
Good	321	40.2	25.9
Poor	478	59.8	44.4
Household overcrowding			
Yes	467	58.4	43.9
No	332	41.6	27.4
Drinking water source			
Tap water	398	49.8	33.4
Spring water	189	23.7	42.9
Mineral water	97	12.1	24.7
Well water	115	14.4	47.0
Type of latrine			
Flush toilet	278	34.8	28.4
Pit latrine	521	65.2	41.6
Household size			
Small (≤ 4)	203	25.4	27.1
Medium (5–7)	354	44.3	36.7
Large (≥ 8)	242	30.3	45.0
Handwashing			
Yes	423	53.0	28.6
No	376	47.0	46.5

Table III: Distribution of clinical manifestations in patients (n = 799).

Clinical manifestation	n	%
Abdominal pain	612	76.6
Dyspeptic syndrome	489	61.2
Gastro-oesophageal reflux disease (GORD)	287	35.9
Vomiting	198	24.8
Hiccups	112	14.0
Gastrointestinal bleeding	54	6.8

Table IV : Distribution of endoscopic findings (n = 799).

Endoscopic finding	n	%
Normal examination	142	17.8
Erosive gastropathy	218	27.3
Congestive gastropathy	176	22.0
Bulbopathy	97	12.1
Peptic oesophagitis	84	10.5
Gastric or duodenal ulcer	52	6.5
Gastroduodenal ulceration	30	3.8

Table V: Univariate analysis of factors associated with *H. pylori* infection.

Variable	Hp + n (%)	Hp – n (%)	p-value
Male sex	166 (56.1)	246 (48.9)	0.048
Age 20–39 years	136 (45.9)	206 (41.0)	0.164
Low socioeconomic status	162 (54.7)	194 (38.6)	< 0.001
Poor hygiene conditions	212 (71.6)	266 (52.9)	< 0.001
Household overcrowding	205 (69.3)	262 (52.1)	< 0.001
Well or spring water	135 (45.6)	169 (33.6)	0.001
Pit latrines	217 (73.3)	304 (60.4)	< 0.001
Large household size (≥ 8)	109 (36.8)	133 (26.4)	0.002
Absence of handwashing	175 (59.1)	201 (40.0)	< 0.001
Occupation: unemployed	64 (21.6)	79 (15.7)	0.037

Table VI : Multivariate analysis of factors associated with *H. pylori* infection (logistic regression).

Variable	Adjusted OR	CI 95%	p-value
Poor hygiene conditions	2.14	3.01–1.52	0.001 >
Low socioeconomic status	1.87	2.67–1.31	0.001 >
Household overcrowding	1.72	2.43–1.22	0.002
Absence of handwashing	1.68	2.33–1.21	0.002
Pit latrines	1.45	2.05–1.03	0.034
Well or spring water	1.39	1.92–1.01	0.045
Large household size	1.28	1.78–0.92	0.142
Male sex	1.19	1.63–0.87	0.276

5. Discussion

Our analytical cross-sectional study, conducted in 799 patients attending a gastroenterology outpatient clinic in a private facility in Brazzaville, found a frequency of *H. pylori* infection of 37.0% based on the stool antigen test. This figure lies at the lower end of the prevalence range reported in sub-Saharan Africa and warrants discussion in light of the methodologies used and of the recruitment setting.

5.1. Frequency of Infection

Our results are lower than those reported in other African studies. In Yaoundé (Cameroon), Ankouane Andoulo et al. [3] reported an overall prevalence of 72.5% in symptomatic subjects referred for upper gastrointestinal endoscopy, using a rapid urease test. In

Brazzaville, Ontsira Ngoyi et al. [7], using a molecular approach (real-time PCR), found a high hospital-based prevalence. More recently, Atipo-Ibara et al. [8] reported a molecular carriage rate of 91% in a series of 100 symptomatic patients in Brazzaville. In Benin, Séhonou et al. [4] found a lower prevalence of 39.3% using the ^{14}C -urea breath test, close to our results. The African literature review by Ouedraogo et al. [9] further showed that the mean prevalence of the infection has significantly decreased in recent years in Africa, while remaining highest in West Africa (58.46%) compared with East Africa (26.49%).

Several factors may account for the relatively lower frequency observed in our study. First, our recruitment took place in a private clinic, where patients of medium-to-high socioeconomic status

with better hygiene conditions than those seen in university hospital settings predominate. Second, the diagnostic method used the stool antigen test has a high sensitivity and specificity, estimated at 90–95%, but may underestimate infection in cases of recent proton-pump inhibitor or antibiotic use, although our exclusion criteria aimed to minimise this bias [10]. In the global meta-analysis published by Li et al. [11], the worldwide prevalence of *H. pylori* has significantly declined between 1980 and 2022, mainly attributed to improvements in socioeconomic conditions, access to safe drinking water and eradication policies.

5.2. Sociodemographic Profile and Associated Factors

The male predominance (51.6%) observed in our series is consistent with most African studies [3,4,7]. The 20–39-year age group, which predominated, corresponds to the working-age population, more likely to seek care for digestive disorders. Our data confirm, in multivariate analysis, the leading role of socio-environmental determinants in the transmission of *H. pylori*: poor hygiene conditions (aOR = 2.14), low socioeconomic status (aOR = 1.87), household overcrowding (aOR = 1.72), absence of handwashing (aOR = 1.68), pit latrines (aOR = 1.45) and consumption of well or spring water (aOR = 1.39).

These results are consistent with the meta-analysis by Yuan et al. [12] on the social determinants of health and *H. pylori* infection, which demonstrated that intra-household overcrowding, unsafe drinking water, low educational attainment and poverty constitute the main risk factors for infection. Similarly, Bashir et al. [2], in a 2023 systematic review, confirmed that faecal-oral and oral-oral transmission is directly conditioned by domestic hygiene conditions. The case-control study conducted by Mulu et al. [13] in Addis Ababa also found a significant association between *H. pylori* infection, use of unsafe drinking water and large household size, with adjusted odds ratios comparable to ours.

The “unemployed” occupation, associated with infection in univariate analysis, likely reflects an effect mediated by socioeconomic status, since this variable lost its significance after adjustment. The association between infection and the “housewife” occupation, reported by Dembélé et al. [14] in Mali, suggests a role for intra-familial exposure and for the care of young children, who are often vectors of early transmission.

5.3. Clinical and Endoscopic Aspects

Abdominal pain (76.6%) and dyspepsia (61.2%) were the most frequent reasons for consultation, in line with the African literature [3,4,8]. The predominant endoscopic finding was erosive gastropathy (27.3%), followed by congestive gastropathy (22.0%). Peptic ulcer disease (6.5%) and gastroduodenal ulceration (3.8%) accounted for a smaller proportion, consistent with the results of the Cameroonian series of Ankouane Andoulo et al. [3] and of the Congolese series of Atipo-Ibara et al. [8]. The low frequency of gastrointestinal bleeding (6.8%) reflects the outpatient recruitment of our study.

It should be noted that a normal endoscopy in 17.8% of symptomatic patients does not exclude infection, since many infected

subjects are asymptomatic or present with minimal gastritis that cannot be detected macroscopically. This underlines the value of non-invasive tests such as the stool antigen test [10,15].

5.4. Study Limitations

Our work has several limitations. First, the single-centre design and the recruitment in a private clinic limit the generalisability of our results to the whole population of Brazzaville. Second, the diagnosis was based solely on the stool antigen test, without histological or breath-test confirmation. Finally, the assessment of hygiene conditions and socioeconomic status was based on self-reported data, potentially subject to classification bias. Nevertheless, the large size of our sample and the robust multivariate analysis give our results a valuable contribution to the epidemiological knowledge of *H. pylori* infection in the Republic of Congo.

6. Conclusion

The frequency of *H. pylori* infection in a gastroenterology outpatient clinic in a private facility in Brazzaville is 37.0%. This frequency, although lower than that reported in university hospital settings, remains high and reflects the endemic nature of the infection in our country. The associated factors are essentially socio-environmental: poor hygiene conditions, low socioeconomic status, household overcrowding, absence of handwashing, pit latrines and consumption of untreated water. These findings support the case for an integrated public health strategy combining health education, improved access to safe drinking water and sanitation, and the promotion of non-invasive diagnostic and screening tests.

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