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Prevalence, Clinical and Demographic Characteristics of *Helicobacter pylori* in Patients Undergoing Esophagogastroduodenoscopy in Specialized Health Centers in Two Departments of the Colombian Coffee Growing Axis

Prevalencia, características clínicas y demográficas de infección por *Helicobacter pylori* en pacientes sometidos a esofagogastroduodenoscopia en centros especializados de salud de dos departamentos del eje cafetero colombiano

ABSTRACT

Helicobacter pylori is a Gram-negative, microaerophilic bacterium with the ability to survive in extreme acid environments, with pH below 4.0. It is estimated that more than half of the world's population is infected with this bacterium. **Objective:** To determine the prevalence, clinical and demographic characteristics of *Helicobacter pylori* infection in patients undergoing esophagogastroduodenoscopy in two specialized centers of the Coffee Growing Axis in Pereira and Manizales from February to October 2018. **Method:** Cross-sectional descriptive observational study in which the proportion of positivity to *Helicobacter pylori* in a period of time was determined. **Results:** The study included 94 patients; the prevalence of positivity to *Helicobacter pylori* was 86.1% (81/94), 56 (59.5%) of which were diagnosed by culture and 52 (55.3%) by histology. In the histological study, of the 24 (25.5%) subjects who presented precursor lesions of malignancy, 9 (9.5%) were positive for *Helicobacter pylori*, while in the 70

subjects (74.5%) without precursor lesions of malignancy, 43 (45.7%) were positive. The significant variables for *Helicobacter pylori* infection were: Histological response for precursor lesions of malignancy: OR of 0.3808 (95% CI: 0.1408-0.9907) p=0.04 and epigastric pain: OR 0.09489 (95% CI: 0.01928-0.3637) p=0.001. **Conclusion:** The frequency of *Helicobacter pylori* infection in the Departments of Risaralda and Caldas is high, and does not discriminate against gender, age, race or origin of the study subjects; Epigastric pain continues to be the most relevant symptom in the diagnosis of *Helicobacter pylori* infection and the combination of diagnostic tests improves the diagnosis of *Helicobacter pylori* infection.

Keywords: *Helicobacter pylori*, infection, prevalence, bacterium, gastritis (source: MeSH, NLM)

RESUMEN

Helicobacter pylori es una bacteria gram-negativa, microaerófilica, con capacidad para sobrevivir en medios ácidos extremos, con pH inferiores a 4,0. Se estima que más de la mitad de la población mundial está infectada con esta bacteria. **Objetivo:** Determinar la prevalencia, las características clínicas y demográficas de infección por *Helicobacter pylori* en pacientes sometidos a esofagogastroduodenoscopia en dos centros especializados del Eje Cafetero en Pereira y Manizales, de febrero a octubre de 2018. **Método:** Estudio observacional descriptivo de corte transversal en el cual se determinó la proporción de positividad al *Helicobacter pylori* en un periodo de tiempo. **Resultados:** Se incluyeron 94 pacientes; la prevalencia de positividad al *Helicobacter pylori* fue del 86,1% (81/94), de los cuales 56 (59,5%) se diagnosticaron por cultivo y 52 (55,3%) por histología. En el estudio histológico, de los 24 (25,5%) sujetos que presentaron lesiones precursoras de malignidad, 9 (9,5%) fueron positivos para *Helicobacter pylori*, mientras que, en los 70 sujetos (74,5%) sin lesiones precursoras de malignidad, 43 (45,7%) resultaron positivos. Las variables significantes para infección por *Helicobacter pylori* fueron: respuesta histológica para lesiones precursoras de malignidad: OR de 0,3808 (IC 95%: 0,1408- 0,9907) p=0,04 y la epigastralgia: OR 0,09489 (IC 95%: 0,01928-0,3637) p=0,001. **Conclusión:** La frecuencia de infección por *Helicobacter pylori* en los departamentos de Risaralda y Caldas es alta, y no discrimina sexo, edad, raza ni procedencia de los sujetos de estudio; la epigastralgia sigue siendo el síntoma más relevante en el diagnóstico de la infección por *Helicobacter pylori* y la combinación de pruebas diagnósticas mejora el diagnóstico de la infección por dicha bacteria.

Palabras clave: *Helicobacter pylori*, infección, prevalencia, bacteria, gastritis (fuente: DeCS, BIREME)

Prevalence, Clinical and Demographic Characteristics of *Helicobacter pylori* in Patients Undergoing Esophagogastroduodenoscopy in Specialized Health Centers in Two Departments of the Colombian Coffee Growing Axis

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INTRODUCTION

Helicobacter Pylori (*H. pylori*) infection has a high prevalence and distribution worldwide [1]. It is estimated that about half of the population is infected with this Gram-negative, microaerophilic bacterium [2] which has the ability to survive in extreme acid environments [3]. This species has evolved with man and with the complex variations and interactions between the bacterium and the host [4], causing long-term diseases such as gastric cancer [3]. *H. pylori* produces persistent inflammation in the gastric mucosa [3], and increases the risk of clinical pictures such as gastroduodenal peptic ulcer, and later damage to the wall with acute infection (gastritis), which can evolve to chronic forms, up to intestinal metaplasia, dysplasia and gastric adenocarcinoma [2, 5].

The bacterium transmission can be oral-oral or fecal-oral and occurs mainly in the first 5 years of life [6], and is associated with low socioeconomic status, deficient hygiene and overcrowding [7]. The main virulence factors are genes (cagA, vacA, oipA and babA) [8] that activate inflammatory protein responses and increase resistance to stomach acid pH, reactive oxygen species and nitrous compounds that affect DNA stability [3] and usually manifest differently according to geographic area [9].

H. pylori is etiologically related to 90% of intestinal gastric cancers [10]. For this condition, the World Health Organization (WHO) classifies it as a class I carcinogen [11] and also associates it with important nutritional aspects, such as poor iron absorption, growth retardation due to lack of vitamins and the deficit of the acid barrier of the host against pathogens, which predispose the individual to intestinal diseases [12].

H. pylori infection is unevenly distributed among different populations [9]. Developing continents are regularly the most affected with prevalence between 70 and 90%: Africa (79.1%), Latin America and the Caribbean (63.4%) and Asia (54.7%). In developed continents, prevalence ranges between 20 and 40%: in North America (37.1%) and Oceania (24.1%) [13]. Colombia reported a prevalence of *H. pylori* infection above 80% in 2016 [14]; even though there is little

research on the subject, a study in the department of Nariño reported a prevalence of infection of 55% in children at two years of age, 80% at 8 years of age and 96% in a group of people aged 18 to 24 years [15].

The objective of this research was to determine the prevalence, clinical and demographic characteristics of *H. pylori* infection in patients undergoing esophagogastroduodenoscopy in two specialized health centers of the Coffee Growing Axis located in the cities of Pereira and Manizales, where the inhabitants of the departments of Risaralda and Caldas go for specialized gastroenterology consultation.

MATERIALS AND METHODS

Study design: This research did not perform any intervention to modify the natural history of the disease. It was a cross-sectional descriptive observational study, with prospective data collection made through an anamnesis performed on patients who required gastroenterology consultation, and needed to undergo esophagogastroduodenoscopy for the diagnosis and treatment of their gastric disease in the specialized centers of Pereira and Manizales.

Selection criteria: Adult patients of both genders were included, referred for gastroenterology consultation, who agreed to participate voluntarily in the study, and who underwent histological studies and culture for the diagnosis of *H. pylori* infection. Patients excluded were those with comorbidities, baseline immunosuppression due to risk of infection, previous gastric surgery and use of proton pump inhibitors, anti H2, antibiotics, 4 weeks prior to the study.

Sample size and sampling: It was a convenience sampling resulting in 94 patients selected sequentially between February and October 2018 in two gastroenterology services in Pereira and Manizales, where the inhabitants of the departments of Risaralda and Caldas, respectively, go for specialized gastroenterology consultation.

Data management and statistical analysis: The clinical characteristics were obtained through the culture and histopathology response variable and the demographic characteristics were obtained through

the variables from the survey, which were summarized using descriptive statistics. The distribution of the numerical variables was evaluated using the Kolmogorov-Smirnov test; when the variables assumed a parametric distribution, the mean was used as a measure of central tendency and the standard deviation (SD) as dispersion; otherwise, the median and interquartile ranges were used. Categorical variables were presented as proportions in frequency tables. To explore possible factors associated with *H. pylori* infection, a bivariate analysis was conducted, taking the OR with their respective 95% confidence intervals as a measure of association, and the prevalence was determined through the proportion of positivity to *Helicobacter pylori* in a period of time, over the total population studied in specialized health centers in two departments of the Colombian Coffee Growing Axis.

The dependence between the categorical variables of exposures and *H. pylori* infection was evaluated with the chi-square test, assuming p values less than or equal to 0.05 as significant. A binomial logistic regression was used to adjust the OR that had a significance of 0.20 or less in the bivariate analysis. Variables with a significance of 0.20 in the bivariate analysis were evaluated by logistic regression. The models were constructed using the Backward strategy, and the model with the lowest number of variables validated through the likelihood ratio statistical test was used.

All analyses were performed with the Stata 12 ® statistical package (*Stata corp., 2011, Stata 12 Base Reference Manual, Collage Station, TX, USA*).

Ethical considerations: This research was approved as a risk-free research by the ethics committee of Universidad Libre Seccional Pereira, according to Act No.2 of April 30, 2018.

Conflict of interests: The researchers declare that they have no conflict of interest.

RESULTS

Between February and October 2018, 740 gastroenterology consultations were recorded in two specialized centers in the cities of Pereira and Manizales, of which 94 patients met selection criteria (Figure 1).

The mean age was 46 years (SD of 10.34); the mean body mass index (BMI) was 25.73 kg/m2 (SD of 4.93). The female gender was the most frequent with 76.5%; most of the patients were housewives (49%) and 49% of the population were in the subsidized regime. Regarding origin, 59.5% of the patients were from Risaralda. The gastroenterologist made a presumptive diagnosis of *H. pylori* infection in 55 patients (Table 1).
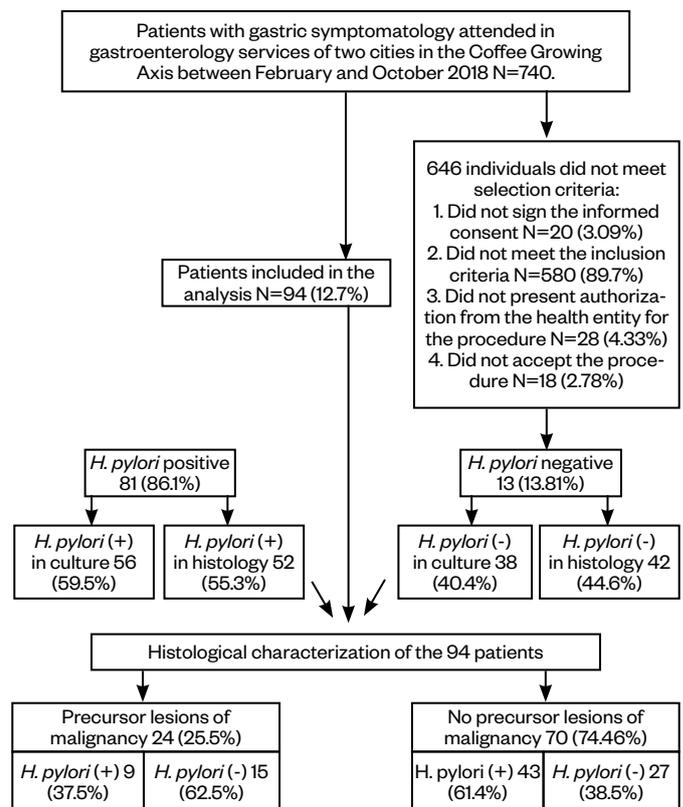

Figure 1. Flow chart of information

Regarding the results of the diagnostic tests, 81 (86.1%) of the patients had at least one positive test and 13 (13.81%) were negative; for the positive results, 56 (59.5%) were positive in culture and 52 (55.3%) were positive in histology, while for the negative results, 38 (40.4%) were negative in histology and 42 (44.6%) were negative in histology (Figure 1).

In the histological study, 24 (25.5%) subjects had precursor lesions of malignancy (PLM), of these 9 (37.5%) were positive for *H. pylori*, while in the 70 subjects (74.46%) with non-precursor lesions of malignancy, 43 (61.4%) were positive for *H. pylori* (Figure 1).

Table 1. Clinical and demographic characteristics of the study population.

Characteristics	Media	Standard Deviation (SD)
Age (years)	46.03	(*) 10.3
BMI (kg/m)	25.73	(*) 4.9
Weight (Kg)	67.03	(*) 13.2
Height (m)	1.60	(*) 0.08
Number of cohabitants	3 (***)	(**) 2-4
Gender	N	%
Male	22	23.4
Female	72	76.6
Occupation		
Housewife	46	48.9
Worker	31	32.9
Pensioner	14	14.8
Student	3	3.2
Social Security		
Subsidized	46	48.9
Contributory	13	13.8
Special	35	37.2
Origin		
Risaralda	56	59.5
Caldas	36	38.2
Quindío	1	1.1
Valle del Cauca	1	1.1
Histology result for *H. pylori*		
Positive	52	55.3
Negative	42	44.6
Endoscopic response		
Chronic antral gastropathy	55	58.5
Chronic atrophic antral gastropathy	10	10.6
Chronic corporoantral gastropathy	13	13.8
Chronic Corporoantral atrophic gastropathy	11	11.7
Other gastropathies	5	5.3
Culture result for *H. pylori*		
Positive	56	59.5
Negative	38	40.4

(*) Standard Deviation
(**) Interquartile Range
(***) Median

In the endoscopy response variable, when compared with positivity, it was found that 50 (53.19%) patients with chronic antral gastropathy had a positivity to *H. pylori*; likewise, 10 (10.6%) patients with chronic atrophic antral gastropathy had positivity to the bacterium; 9 (9.57%) patients with chronic corporoantral atrophic gastropathy showed this positivity; finally, 8 (8.51%) patients with chronic corporoantral gastropathy had a positivity to *H. pylori* (Table 2).

Table 2: Endoscopy results and positivity to *H. pylori*

Endoscopy result	H. pylori (+) n (%)	H. pylori (-) n (%)	Total n (%)
One or more Prepyloric Ulcers	3 (3.19)	0 (0.0)	3 (3.19)
Chronic antral gastropathy	50 (53.19)	5 (5.32)	55 (58.51)
Chronic atrophic antral gastropathy	10 (10.64)	0 (0.0)	10 (10.64)
Chronic corporoantral atrophic gastropathy	9 (9.57)	2 (2.13)	11 (11.70)
Chronic corporoantral gastropathy	8 (8.51)	5 (5.32)	13 (13.83)
Erosive antral gastropathy plus duodenal ulcer	1 (1.06)	1 (1.06)	2 (2.13)

In the female gender, 63 patients (67.02%) showed positivity for H. pylori compared to 18 (19.15%) males. Variables such as race, the "mestizo" population presented a positivity for *H. pylori* in 77 (81.9%) patients. However, they were not statistically significant (Table 3). Regarding the determinants of infection for *H. pylori*, the exposure variables in the bivariate analysis that showed association were: histological response for precursor lesions of malignancy with an OR of 0.3808 (95% CI: 0.14 - 0.99) this association was statistically significant with a p-value of (0.041), epigastralgia symptom with an OR 0.09 (95% CI: 0.02-0.36) and statistical significance with a p-value of (0.0001) and allergies with an OR of 0.01 (95% CI: 0.53-0.74) and statistical significance with a p-value of (0.01) (Table 3).

Table 3: Determining factors of H. pylori infection

Factors	Description	N	Hp (+) %	Hp (-) %	OR (95% CI)	P-value
Gender	Female	72	67.02	9.57	1,55	0.50
	Male	22	19.15	4.26	(0.3-6.3)	
Race	Mestizo	90	81.90	13.80	0,0	0.41
	Other	4	4.20	0	(0.0-7.195)	
Histologic response	Precursor lesions of malignancy	24	9.50	15.90	0.38	0.04*
	Non precursor lesions of malignancy	70	45.70	28.70	(0.14- 0.99)	
Epigastralgia	Suffering from the symptom	70	20.21	65.96	0.09	0.0001*
	Not suffering from the symptom	24	10.64	3.19	(0.01-0.36)	
Family history of infection	Yes	60	55.32	8.51	1.12	0.85
	No	34	30.85	5.32	(0.34-3.74)	
History of *H. Pylori*	Yes	26	25.53	2.13	2.32	0.29
	No	68	60.64	11.70	(0.48-11.25)	
Surgical history	Yes	70	67.02	7.45	3.00	0.07
	No	24	19.15	6.38	(0.90-10.06)	
Allergies	Yes	14	9.57	5.32	0.01	0.01*
	No	80	76.60	8.51	(0.53-0.74)	

Statistically significant associations

When multivariate analysis was performed, binomial logistic regression after adjusting for the presence of epigastralgia and report of any allergy presented as the only variable associated with *H. pylori* infection the presence of precursor lesions of malignancy with an OR 4.076 (95% CI: 1.72-6.42).

DISCUSSION

This study determined the frequency and clinical and sociodemographic characteristics of patients undergoing esophagogastroduodenoscopy in two centers specialized in gastroenterology in Pereira and Manizales, where 740 consultations for gastroenterology were recorded, and only 94 subjects were eligible for study, finding an overall frequency of positivity for *H. pylori* of 86.1% for two major cities of the Coffee Growing Axis. This frequency is high if compared with the frequency of another region of the country reported by Correa and collaborators in the city of Medellín 36.4%. Nevertheless, it is within the expected if compared with the report by Otero et al. where the prevalence of *H. pylori* infection is above 80% [16].

One of the possible reasons why the prevalence was so high in the study in this area of the country was the use of two diagnostic tests to analyze the biological material extracted in the esophagogastroduodenoscopy. In the population studied, 40.4% were positive by the two tests. However, we looked for positivity by either method, culture and histological study in patients, which allowed establishing *H. pylori* positivity with greater precision for infection. This is because from the 81 (86.1%) *H. pylori* positive cases, 56 (59.5%) were established by culture and 52 (55. 3%) by histological study. This was ratified by Moncayo et al. with the comparison of diagnostic methods to determine the infection in the department of Quindío, where the concordance of at least 2 positive diagnostic methods allowed establishing the real prevalence of the infection, which was higher than that detected by the individual methods [15].

Histopathology showed a positivity of *H. pylori* in patients with precursor lesions of malignancy in 9 (37.5%) patients, which agrees with what was reported in the literature by Pelayo Correa, where he suggests that *H. pylori* infection promotes cancerous processes generated by atrophic multifocal gastritis, which can be accompanied by intestinal metaplasia [7].

In our study, chronic atrophic gastritis plus intestinal metaplasia was found to be present in the histologic responses that were grouped to dichotomize the variable precursor lesions of malignancy. Since this study is descriptive and cross-sectional, causality cannot be established to describe the natural disease process.

This research reported patients at different stages of gastric disease secondary to *H. pylori* infection. However, the background of *H. pylori* was not shown to be associated with the current infection, as has been observed in other studies by Paredes, where *H. pylori* is considered the causative agent of chronic active gastritis and one of the factors in the multifactorial etiology of peptic ulcer, gastric adenocarcinoma and low-grade malignant MALT (Mucosa-Associated Lymphoid Tissue) lymphoma [15].

The main clinical manifestation reported in this research was epigastralgia considered as the cardinal manifestation of gastroduodenal disease and the first reason for gastroenterology consultation, as referred by the Colombian clinical practice guide [16]; other important symptoms for diagnosis in this research were gastroesophageal reflux with 28 (29.7%), unspecified abdominal pain with 9 (9.6%) and esophagitis with 3 (3.2). This is consisting with the research of Bernaola, where *H. pylori* develops with clinical manifestations typical of gastritis such as epigastric pain, nausea and reflux [17].

Regarding extra gastrointestinal symptoms, we found in this research that non-specific allergies, headache and diarrhea were the most frequent. Nonspecific allergies were more strongly associated with the presence of *H. pylori* as reported by Arturo et al. in 2017, with the numerous cardiovascular, dermatological and immunological pathologies away from the gastrointestinal sphere, which may influence positivity to *H. pylori* [18].

Errors in the classification of subjects as positive and negative for *H. pylori* were mitigated during the esophagogastroduodenoscopy procedure which was performed by trained personnel and analyzed by two highly sensitive diagnostic methods such as culture and histopathology. All anamnesis data were independently verified with the clinical history to control for recording errors.

CONCLUSION

- The overall frequency of positivity for *H. pylori* in this region of Colombia was high from February to October 2018. It did not discriminate gender, age, or race in its demographic characteristics, and its main clinical feature was epigastralgia as a relevant symptom for the diagnosis of *H. pylori* confirmed through the combination of diagnostic tests.

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