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# Epidemiological Distribution of Risk Factors Contributing to Symptomatic *Helicobacter Pylori* Infection in Diyala Province, Iraq

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## Abstract

*Helicobacter pylori* is a worldwide spread bacterium, that invades the submucosal membrane of the stomach via feco-oral or feco-fecal transmission, causing several gastric and duodenal diseases. The study aims to assess risk factors for the symptomatic *Helicobacter pylori* infection and their epidemiological distribution. A cross-sectional study was conducted from October 2020 to May 2021 in Baquba, Iraq. It was conducted on a sample of outpatient patients who complain of various symptoms of gastrointestinal disorders, where the sample size was 194 patients, their ages ranged from 15 to 70 years, the main characteristics taken up in the study included age, sex, and place of residence, smoking status. *H. pylori* infection was recognized by identifying anti-*H. Pylori* (IgG) in patient serum using the ELISA technique. Chi-squared and Binomial tests were adopted to assess the difference between study variables. The study shows that the highest rate of infection was among patients aged 15-30 years (45.7%), most patients were females (66.3%), and the majority of them (68.5%) were rural dwellers. In conclusion, younger ages, female gender, rural dwellers, non-smokers, and those who complained of stomach pain were significantly associated with the *Helicobacter pylori* infection.

**Keywords:** *Helicobacter Pylori*, Epidemiological Distribution, Risk Factors, Symptomatic Infection

## 1. Introduction

*Helicobacter pylori*, is a worldwide spread a pathogenic bacterium present in the gastric mucosa of infected humans, with a spiral shape, was first isolated by Warren and Marshall in 1982 and soon after with chronic gastritis, the global prevalence of *H. pylori* is over 50%, mostly in developing countries (Shurooq et al., 2014; Aqeel et al., 2020; Frenck et al., 2003; Peleteiro et al., 2014). As reported by primary care physicians, 78% of physicians believe that contaminated water and foods are the commonest sources of the spread of infection causing chronic gastritis that may turn into gastric carcinogenesis later (Ahmed et al., 2009; Cohen et al., 2021). This bacterium invades the submucosal membrane of the stomach as well as secretes the enzyme urease, which converts the acidic medium of the stomach to alkaline and thus is safe from stomach acids (Shiota et al., 2013).

50% of general population carries these bacteria without symptoms, which makes detection of infection late and then it either transmitted through oral-oral or fecal-oral route, it has been isolated from dental plaque, saliva and feces (Plummer et al., 2007). The clinical outcome of *H. pylori* infection may depend on several factors, such as age, environmental factors, immune response, and genetic factors (Plummer et al., 2007). And it varies in different societies and geographical locations, as social and demographic characteristics, economic status, health practices and lifestyles help spread these bacteria (Kamholz., 2006; Olokoba et al., 2013; World gastroenterology organization global guideline., 2011). The incidence of infection among the elderly who do not show symptoms of the disease is about 40-60%, *Helicobacter pylori* have been identified as a Class A carcinogen by the International Agency for Research on Cancer since 1994 because of its ability to induce carcinogenesis of the gastric mucosa (Nicoline et al., 2013; Schistosomes., 1994). It could be because of that mismanagement of *H. pylori* infection thus contributes to tumors in a different oorgansof the gastrointestinal tract, most commonly stomach, duodenal, pancreatic and liver cancers, especially in cases with a past history of hepatitis virus infection, which increases the development of the disease (Rabelo-Gonçalves et al., 2015).

## 2. Methods

A cross-sectional study conducted from October 2020 to May 2021 in Baquba, Iraq. This city is the center of Diyala province, whose population is made up of heterogeneous groups of various spectra and sects.

### 2.1 Sample collection

This study was conducted on a sample of outpatient patients/ Doctors Street in Baquba city who complained of various symptoms of gastrointestinal disorders, where the sample size was 184 patients. The sample size was based on total patients behaving the sample. Where, the level of confidence was 95% and margin of error was 5%, using the following formula:

$$\text{Unlimited population: } n = \frac{z^2 \times \hat{p}(1-\hat{p})}{\epsilon^2}$$

$$\text{Finite population: } n' = \frac{n}{1 + \frac{z^2 \times \hat{p}(1-\hat{p})}{\epsilon^2 N}}$$

where

**z** is the z score

**ε** is the margin of error

**N** is the population size

**ĥ** is the population proportion

### 2.2 Eligibility and laboratory assessment

The study included persons suspected of contracting helicobacter pylori infection in the 15-70 age groups. Individuals who used antimicrobials 2 weeks before the date of detection were excluded from the study. Pregnant and nursing mothers were also excluded. The investigators invited patients to participate voluntarily in the study with an explanation and clarification of the study protocol. The characteristics taken up in the study included age, sex and place of residence, smoking status, the main complaint that prompted the patient to request medical assistance, the duration of an early or late diagnosis of the infection and the statement of the previous history of gastrointestinal symptoms through the use of a simple questionnaire constructed.

The intravenous blood sample was collected from each participating patient by 6-8 ml. Each blood sample was immediately divided into two containers, one containing anticoagulants, EDTA and another without anticoagulants. Normal container samples are allowed to clot at room temperature, then undergo centrifuge at 3,000 rpm for 5 minutes to obtain the serum, which has been transferred to a sterile Eppendorf tube and stored at -20°C until further analysis. *H. pylori* infection was recognized by identifying anti-*H. pylori* (IgG) in patient serum using the-ELISA Indirect Enzyme-Linked Immune Sorbent Assay corresponding to the company's protocol (Abcam, UK). ELISA Kit has 94.4% sensitivity and 92% specificity. All ELISA conditions were

achieved in duplicate and each sample was recorded with a mean IgG titer of over 20 U/ml as positive (reactive) for infection.

### 2.3 Statistical analysis

To analyze the data statistically, the information for each questionnaire was entered into Microsoft excel. Statistical analysis of the results of the study was carried out using the Statistical Package of Social Sciences (SPSS) program, Version 24. Search results were expressed as numbers and percentages. Chi-squared and Binomial tests were adopted to assess the difference between study variables. A P-value of less than 0.05 was considered significant.

### 3. Results

Table 1 Expresses the rate of helicobacter pylori infection of patients based on their demographic characteristics, showing the highest rate (45.7%) significantly among patients aged 15-30 years and the lowest rate (20.7%) among those over 55 years of age, most patients are significantly females (66.3%), and a majority of whom are significantly rural dwellers (68.5%).

Table 1: Distribution of study subjects based on their demographic characteristics

Demographic characteristics	Variables	N	%	p-value
Age/years	15-35 years	84	45.7	<b>0.000</b>
	35-55 years	62	33.7	
	55+	38	20.7	
	Total	184	100.0	
Gender	Males	62	33.7	<b>0.000</b>
	Females	122	66.3	
	Total	184	100.0	
Place	Urban	58	31.5	<b>0.000</b>
	Rural	126	68.5	
	Total	184	100.0	

Table 2 shows that vast majority patients with helicobacter pylori infection are significantly non-smokers and account for 87% of the sample ( $p=0.000$ ).

Table 2: Distribution of study subjects based on their smoking status

Smoking status	No.	%	p-value
Smoker	24	13.0	<b>0.000</b>
Non-smoker	160	87.0	
Total	184	100.0	

Most patients with helicobacter pylori infection at the beginning of symptoms mainly complained of epigastric pain with nausea and vomiting at a rate of 76.1%, as for the duration of complaints of these symptoms until going to the physician, the highest rate of them 43.5% significantly complained of symptoms for less than one month, while the lowest 16.3% complained for more than a year, as shown in the table 3.

Table 3: Distribution of study subjects based on chief complaint

Patient's complaint	Variables	N	%	p-value
Chief complaint	Only epigastric pain	44	23.9	<b>0.000</b>
	Epigastric pain associated with nausea and vomiting	140	76.1	
	Total	184	100.0	
Early detection of HP infection (< 1 months from	Yes	80	43.5	<b>0.090</b>
	No	104	56.5	
	Total	184	100.0	

**the begging of symptoms)**

Table 4 Study demonstrates that most patients with helicobacter pylori infection (78.3%) reported a previous history of gastrointestinal disturbances.

Table 4: Distribution of study subjects based on previous history for GI symptoms

History of previous gastrointestinal symptoms	N	%	p-value
Yes	144	78.3	<b>0.000</b>
No	40	21.7	
Total	184	100.0	

#### 4. Discussion

*H. pylori* infection is one of the most prevalent chronic and common bacteriological diseases lead to many upper stomach and duodenal diseases (Seid & Demsiss., 2018). Although many researches (15-19) have reported that infection rates with helicobacter pylori increase with age (Pilotto & Franceschi., 2014; Neri et al., 1996; Salles., 2007; Hou et al., 2019; Huang et al., 2021). And yet our study has proven otherwise, as the rate of *H. pylori* infection increases significantly at younger ages, especially at 15-30 years, and decreases as age increases. This is consistent with other Iraqi and Arabic studies, because the highest rate of infection was among patients aged 20-30 years in Sulaimani, Iraq (Al-Windi., 2013), 16-18 years in Duhok, Iraq (Al-Brefkani et al., 2021), and age group of 30 years old in Emirates Arabia (Khoder et al., 2019). Other non-Arab studies have also found that rates of *H. Pylori* infections are rising in younger age groups (Syam et al., 2015; Namyalo et al., 2021). In this study, infections rise significantly among younger ages, and this is consistent with other investigations (Khoder et al., 2019; Namyalo et al., 2021). This may be because *H. pylori* bacterium is often acquired in childhood, especially when one of family members becomes infected with this bacterium then transmits it to others at an early age as a result of sharing food tools, and it can last for life [Namyalo et al., 2021; Weyermann et al., 2009; O'Ryan et al., 2015]. This study showed that rates of *H pylori* infections are significantly higher in females and this is in line with other studies [(Al-Brefkani et al., 2021; Khoder et al., 2019, 28]. It may be because females are more interested in preparing food and spend more time in the kitchen than males (Majeed et al., 2020). In addition to that, rates of gender-related *H. pylori* infections are often vary based on the country's development index and geographical area location (Al-Brefkani et al., 2021). For the place of residence, most patients infected with *H pylori* were significantly from rural areas. This finding is similar to two other Iraqi studies (Al-Brefkani et al., 2021; Majeed et al., 2020). The cause may be due to several factors, the most important of which are poor living conditions, lack of personal hygiene, poor environmental conditions, big families, and lack of education in rural areas compared to urban (Al-Brefkani et al., 2021). In this study, smoking has not played a significant role in high rates of *H pylori* infection among patients with symptoms, but the contrary has been shown because most patients were significantly non-smokers. These findings are close to other studies (Al-Brefkani et al., 2021; Khalifa et al., 2014; M6dena et al., 2007), as cigar smoking is not associated with *H pylori* infection. The study showed that helicobacter pylori infection was significantly higher among non-smokers. The reason for this is that most patients in the study sample are females, and smoking among the Iraqi women's community is known to be limited. Three quarters of patients with helicobacter pylori infection at the beginning of symptoms mainly complained of epigastric pain associated with nausea and vomiting. These results are comparable to an Egyptian study (Gomaa et al., 2019), and another Brazilian study (Faintuch et al., 2014). The latter revealed that most patients with *H pylori* (68%) reported complaints of epigastric pain. This explains that individuals with these symptoms due to indigestion are twice more likely to develop *H pylori* infection than those who have not shown symptoms (Aminde et al., 2019). Early detection of *H pylori* infection can prevent the development of the disease and its transformation into chronic inflammation and also reduce the atrophy of the mucosa of the stomach and thus prevent stomach cancer (Yang & Hu., 2021). However, in less than half of patients, the study detected *H pylori* infection with no significant difference ( $p=0.090$ ). This may be due to the effect that some patients practice self-medication or alternative medicine to treat symptoms of the disease without regard to the type and causes of the disease. The results of this study showed that patients with a history of gastrointestinal symptoms were significantly more likely to develop *Helicobacter pylori* infection. That's consistent with other studies (Melese et al., 2019; Hojati et al., 2021). This could be due to bacteria adapting to changes in the stomach

in terms of pH, gastric lining wall and stomach ulceration in patients with a previous history of gastrointestinal symptoms.

## Conclusion

In conclusion: younger ages, female gender, rural dwellers, non-smokers, who complain of stomach pain associated with vomiting and nausea, those with a previous history of gastrointestinal symptoms were significantly associated with the helicobacter pylori infection.

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