

RESEARCH ARTICLE

# Detection of *Helicobacter pylori* Antigens among Patients with Gastroenteritis in Erbil City, Iraq

Pshtewan D. Majeed, Karim J. S. Khoshnaw\*, Hussein M. Abdullah

Department of Nursing, Erbil Polytechnic University, Erbil Medical Technical Institute, Erbil, Kurdistan Region, Iraq

**\*Corresponding author:**

Karim J. S. Khoshnaw,  
Department of Nursing, Erbil  
Polytechnic University, Erbil  
Medical Technical Institute,  
Erbil, Iraqi Kurdistan.

**E-mail:** jwtear.jwan@gmail.com

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## ABSTRACT

*Helicobacter pylori* is a significant pathogen of the gastrointestinal tract infection connected with gastritis, peptic ulcers, and gastric carcinoma. Its infection influence more than half of the world's inhabitants. This study aims to reveal the prevalence rate of *H. pylori* infection among patients with gastroenteritis and to investigate the risk factors such as age, gender, residency, blood group and rhesus factors related to this infection in Erbil city. Of 300 stool specimens from patients presenting with gastroenteritis who were admitted to Rizgary Teaching Hospital, Erbil, Iraq, from September 2018 to February 2019 were collected and screened for the presence of *H. pylori* antigens using rapid immunochromatographic assay (Camp Medica Group, Bucharest, Romania). A questionnaire sheet was prepared and used for each study subject. Of 300 samples examined, *H. pylori* were detected in 79 samples (26.33%). The highest rate of *H. pylori* infection was founded among the age group 21–30 years, but there were no significant differences between them ( $P > 0.05$ ). A significant relationship between *H. pylori* infection and gender (male 19.05% and female 33.33%) was recorded ( $P < 0.05$ ). There was a significant association between *H. pylori* infection and ABO blood group among patients ( $P < 0.05$ ), but there is no significant association between *H. pylori* infection and the type of rhesus factor ( $P > 0.05$ ) that *H. pylori* infection was higher in rhesus factor negative compared to rhesus factor positive. The prevalence was significantly higher among rural area (55.56%) than urban area (23.44%) ( $P < 0.05$ ). We concluded that the spread of *H. pylori* positive rate was high among patients with gastroenteritis in Erbil city. The great prevalence of *H. pylori* was founded in the patients with O blood group, urban area, and females. There was no significant association between *H. pylori* infection and age groups and rhesus factor.

**Keywords:** Detection; *Helicobacter pylori*; Gastroenteritis; Immunochromatographic assay; Erbil city

## INTRODUCTION

*Helicobacter pylori* is a helical, gram negative, microaerophilic bacterium, known to colonize the mucous membrane of the human stomach (Bello et al., 2018) and it is known as a major cause of chronic gastritis, peptic ulcer disease, lymphoma, and gastric carcinoma (Akeel et al., 2018). In fact, it is categorized as a type one carcinogen for human gastric cancer (Zaidi, 2016). In 1983, Warren and Marshall were firstly insulated the bacterium from a patient with chronic gastritis and observe that it is responsible for many gastrointestinal tract diseases (Ali, 2018). Infected persons display with stomach reflux, abdominal ache, intestinal bleeding, fevers, and weight loss (Aitila et al., 2018). This organism is a widespread chronic bacterial infection in over 50% of the world's population. About 70% of the population in developing countries and 25–50% in developed countries were infected with *H. pylori* (Paull et al., 2017). In general, *H. pylori* infection obtained in early life and may persist for a life span if untreated (Niknam et al., 2014). Each year approximately 0.4–1.0% of non-infected person gains *H. pylori* infection (Mohamed et al.,

2010) and the proportion of *H. pylori* infection face to rise with age (Yahya, 2018). Furthermore, over 80% of the infected person with *H. pylori* are showing no symptoms (Alhussaini, 2016).

Person to person transmission of *H. pylori* occurs through contaminated water or food (Jaka et al., 2016). Humans are the main reservoir of *H. pylori* (Mojarrad and Chow, 2017). Poor hygiene, poor diets, poor water supply, geographical distribution, gender, ethnicity, age, educational level, and socioeconomic status have been found to play an important role in *H. pylori* infection (Awuku et al., 2017; Kouitcheu Mabeku et al., 2018).

Some of the different virulence factors of *H. pylori*, such as urease, flagella, vacuolating cytotoxin A, and cytotoxin associated gene A, are playing a significant role in infestation, colonization, and cell propagation (Aziz et al., 2014).

Infection of *H. pylori* can be diagnosed by invasive procedures such as culture, histology, and rapid urease test

and by noninvasive tests include urea breath test, serology, urinary antibody test, and stool antigen test (Ayodele et al., 2018). Recently, stool antigen testing has been used successfully to reveal *H. pylori* antigens in the feces. It is a credible and precise test for detection of the *H. pylori* infection and affirmation of its recovery after therapy and avoids detection of past infection with *H. pylori* (Alim et al., 2010; Omosor et al., 2018). Immunochromatographic assay is an *in vitro* qualitative test for the rapid detection of *H. pylori* antigens in the human stool sample. The test results are designed to aid in the diagnosis of *H. pylori* infection, to monitor the effectiveness of therapeutic treatment and to confirm the eradication of *H. pylori* in peptic ulcer patients (Miftahussurur and Yamaoka, 2016).

Concerning the prevalence of *H. pylori* infection in Iraq, 51% in Hilla city (Al-Sabary et al., 2017), 55.8% in Tikrit city (Alsamarai et al., 2017), 39.2%, 59.2%, and 71.3% in Baghdad city (Al-Jubori et al., 2016; Al-Mossawei et al., 2016; Gutef, 2016), 26.1% and 61.32% in Mosul city (Qibi and Abdulla, 2008; Ali, 2018), 51.2% in Sulaimani city (Mohammed et al., 2017), 49.62% in Kirkuk city (Abdul Razaq et al., 2017), 54.5% in Basrah city (Amer et al., 2014), 51.11% in Misan city (Alhashimi et al., 2017), 28% in Duhok city (Yahya, 2018), and finally in Erbil were 11.3% and 55.8% (Al-Mashhadany, 2018; Hussen et al., 2013) were recorded.

The objectives of this study were to estimate the prevalence of *H. pylori* infection in patients presenting with gastroenteritis and to recognize factors associated with this infection in Erbil city, Iraq.

## MATERIALS AND METHODS

### Sample Collection

This cross-sectional study was carried out on 300 patients with gastroenteritis, 147 males and 153 females ranging in age from 16 to 72 years, hospitalized Rizgary Teaching Hospital over a period of 6 months, started from September 2018 to the end of February 2019 in Erbil city.

Stool samples were collected from each patient in sterile disposable screw cap containers. These were labeled with number, date, and name of each subject. A questionnaire containing demographic, clinical, and environmental data was obtained from each case. The existence of *H. pylori* in fresh stool samples was investigated at the microbiology laboratory of the same hospital using an immunochromatographic test.

### *H. pylori* Antigen Detection

After collection, the stool samples were tested immediately by immunochromatographic assay (Camp Medica Group, Bucharest, Romania) for antigenic detection of *H. pylori*

in human stool and were done according to instructions of the manufacturers.

### Test Procedure

However, to detect *H. pylori*, approximately 100 mg of stool specimen was transferred by a stick into the tube with diluents samples, and then the tube was shaken. After that, three drops (120–150  $\mu$ L) of the solution were added into the rounded well; eventually, the results were read at 10–15 min by observing the coloring lines.

### Results Interpretation

Negative: One red line appears in the control region (C) and no apparent red line in the test region (T) [Figure 1].

Positive: One red line appears in the test region (T) and one line should be in the control region (C) [Figure 1].

### Statistical Analysis

The data were analyzed using Statistical Package for the Social Sciences, version 19. The proportion and their frequencies were checked by Chi-square test.  $P < 0.05$  was considered as statistically significant.

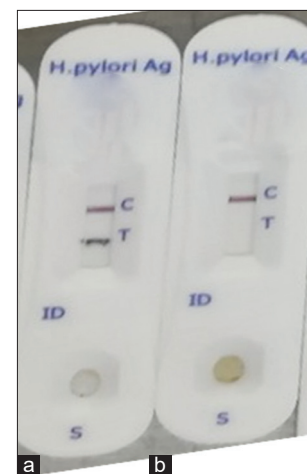
## RESULTS

### *H. pylori* Detection Rates

From the 300 examined stool specimens from patients with gastroenteritis using immunochromatographic assay, 79 (26.33%) and 221 (73.67%) of the participants were positive and negative, respectively [Figure 2].

### *H. pylori* and Gender

Table 1 shows that of 300 study samples, 147 (49%) were males and 153 (51%) were females. Males showed a lower rate of *H. pylori* infection (19.05%) than females recorded (33.33%).



**Figure 1: (a) Helicobacter pylori positive result (b) *H. pylori* negative result**

### *H. pylori* and Age Groups

Table 2 displays the prevalence of *H. pylori* infection by age groups. The higher infection rate (34.44%) was appeared in the age group 21–30 years, while the lower infection (20.83%) reported in the age group <20 years.

### *H. pylori* and Residency

As clarified in Table 3, 55.56% (15/27) of the cases were from rural areas which were significantly  $P < 0.05$  higher than those of urban areas, 23.44% (64/273).

### *H. pylori* and Blood Groups

As illustrated in Table 4, the highest *H. pylori* infection was founded in O blood group (35.83%), followed by A (29%), B (17.46%), and AB (10.42%).

### *H. pylori* and Rhesus Factor

Table 5 shows that the rate of *H. pylori* infection was higher in rhesus factor negative (30.77%) as compared to rhesus factor positive (25.67%).

## DISCUSSION

*Helicobacter pylori* is a major health problem throughout the world, and it is more popular in developing than developed countries. Its infection had been identified as the major

cause of gastrointestinal tract infection (Baqir et al., 2016; Kutaif et al., 2017).

The current study showed that the overall proportion of infection with *H. pylori* causing gastroenteritis was 79/300 (26.33%), as illustrated in [Figure 2]. This result is comparable to other studies where the occurrence of *H. pylori* infection was reported as 24.3% in Uganda (Aitila et al., 2018), 25% in Jordan (Abu-sbeih et al., 2014), 26.1% in Mosul-Iraq (Qibi and Abdulla, 2008; Ali, 2018), 27% in Sikkim-India (Dhakal and Dhakal, 2018), and 28% in Duhok-Iraq (Yahya, 2018), while higher rates than our results were recorded in Pakistan, Iran, Cameroon, Saudi Arabia, and Nigeria (47%), (61.87%), (64.39%), (71.33%), and (81.7%), respectively (Nawaz et al., 2018; Reisi et al., 2017; Kouitcheu Mabeku et al., 2018; Alhussaini, 2016; Bello et al., 2018). Furthermore, in Erbil-Iraq, Sub-Saharan Africa, Nepal, and Yemen lower rates (11.3%, 14.2%, 16%, and 18.45%) of *H. pylori* prevalence were recorded,

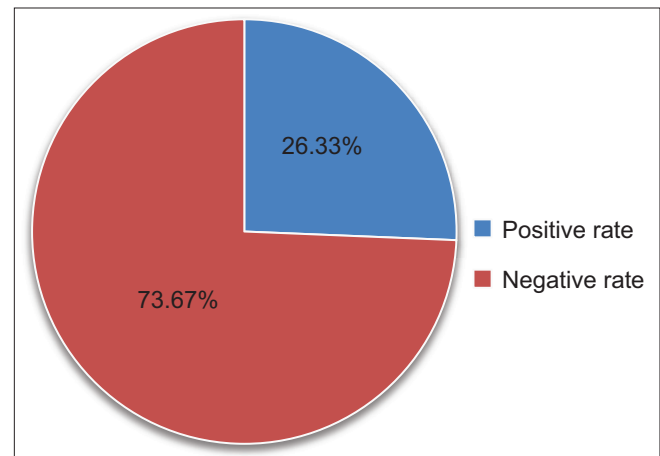


Figure 2: Distribution of patients with gastroenteritis according to their *Helicobacter pylori* infection

Table 1: Distribution of *H. pylori* infection in relation to gender

Genders	No. tested	<i>H. pylori</i> antigen test result		Total (%)
		Positive (%)	Negative (%)	
Male	147	28 (19.05)	119 (80.95)	147 (49)
Female	153	51 (33.33)	102 (66.67)	153 (51)
Total	300	79 (26.33)	221 (73.67)	300 (100)

$P=0.004979$ . Significant at  $P<0.05$ . *H. pylori*: *Helicobacter pylori*

Table 2: Distribution of *H. pylori* infection in relation to age groups

Age groups (years)	No. tested	<i>H. pylori</i> antigen test result		Total (%)
		Positive (%)	Negative (%)	
<20	24	5 (20.83)	19 (79.17)	24 (8)
21–30	90	31 (34.44)	59 (65.56)	90 (30)
31–40	81	18 (22.22)	63 (77.78)	81 (27)
41–50	75	18 (24)	57 (76)	75 (25)
50>	30	7 (23.33)	23 (76.67)	30 (10)
Total	300	79 (26.33)	221 (73.67)	300 (100)

$P=0.344696$ . Non-significant at  $P<0.05$ . *H. pylori*: *Helicobacter pylori*

Table 3: Distribution of *H. pylori* infection in relation to the residency

Residency	No. tested	<i>H. pylori</i> antigen test result		Total (%)
		Positive (%)	Negative (%)	
Urban	273	64 (23.44)	209 (76.56)	273 (91)
Rural	27	15 (55.56)	12 (44.44)	27 (9)
Total	300	79 (26.33)	221 (73.67)	300 (100)

$P=0.000302$ . Significant at  $P<0.05$ . *H. pylori*: *Helicobacter pylori*

Table 4: Distribution of *H. pylori* infection in relation to blood groups

Blood group	No. tested	<i>H. pylori</i> antigen test result		Total (%)
		Positive (%)	Negative (%)	
A	69	20 (29)	49 (71)	69 (23)
B	63	11 (17.46)	52 (82.54)	63 (21)
AB	48	5 (10.42)	43 (89.58)	48 (16)
O	120	43 (35.83)	77 (64.17)	120 (40)
Total	300	79 (26.33)	221 (73.67)	300 (100)

$P=0.002133$ . Significant at  $P<0.05$ . *H. pylori*: *Helicobacter pylori*

Table 5: Distribution of *H. pylori* infection in relation to rhesus factor

Rhesus factor	No. tested	<i>H. pylori</i> antigen test result		Total (%)
		Positive (%)	Negative (%)	
Rhesus ve <sup>+</sup>	261	67 (25.67)	194 (74.33)	261 (87)
Rhesus ve <sup>-</sup>	39	12 (30.77)	27 (69.23)	39 (13)
Total	300	79 (26.33)	221 (73.67)	300 (100)

$P=0.500108$ . Non-significant at  $P<0.05$ . *H. pylori*: *Helicobacter pylori*

respectively (Al-Mashhadany, 2018; Awuku et al., 2017; Ansari et al., 2016; Al-Mashhadany and Mayass, 2018). These variations could be explained by age and health conditions of the patients, number of samples, social habits of the population, socioeconomic status, ethnicity, diagnostic techniques, and geographical distribution (Alhussaini, 2016; Tsongo et al., 2015).

According to Table 1, the rate of *H. pylori* infection in female patients (33.33%) significantly higher than in male participants (19.05%) ( $P = 0.004$ ). In some studies, it was reported that the higher frequency of *H. pylori* infection was found in females and similarly this difference was usually significant (Jaff, 2011; Hwaid et al., 2013; Awuku et al., 2017; Reisi et al., 2017; Nawaz et al., 2018; Samson et al., 2018). This is in contrast to the findings in Basrah-Iraq, Erbil-Iraq, Uganda, Sulaimani-Iraq, and Misan-Iraq; they were recorded that there is no significant relationship between the rate of *H. pylori* infection and gender (Mohamed et al., 2010; Hussien et al., 2013; Tsongo et al., 2015; Mohammed et al., 2017; Alhashimi et al., 2017). These results may be explained by the hormonal differences between the two genders, but in general, there is no significant relationship between sex and *H. pylori* infection rate (Ansari et al., 2016; Mohammed et al., 2017).

According to the age groups [Table 2], nonsignificant association between the rate of *H. pylori* infection and age groups was noticed ( $P = 0.344$ ). The greatest prevalence (34.44%) of *H. pylori* infection showed among patients aged 21–30 years, whereas the lowest rate (20.83%) was happened in patients <20 years. This result agreed to other studies conducted in Saudi Arabia, Egypt, Diyala-Iraq, Erbil-Iraq, and Nigeria (Karima et al., 2006; Hwaid et al., 2013; Haggag et al., 2016; Muhemmed and Mohammed, 2016; Samson et al., 2018), and it is differed from other prior studies that revealed great prevalence rate of *H. pylori* infection generally recorded in more than 40 years (Hussien et al., 2013; Tawfeeq et al., 2013; Jaka et al., 2016). The differences between the present results and results of the other studies may be due to the nutrition status of the patients, socioeconomic status, inadequate sanitation, water supply, and environment condition (Al-Mossawei et al., 2016).

As regards to geographical region distribution [Table 3], the higher rate of infected participants with *H. pylori* was found in rural area (55.56%) than in urban area (23.44%), with significant difference ( $P = 0.000$ ). This comes in acceptance with other studies in Tanzania (Jaka et al., 2016) and disagrees with the study conducted in Erbil (Al-Mashhadany et al., 2018). These differences between patients from rural and urban areas might be due to poor water supply, poor sewage disposal, social habits of the

population, and low education (Al-Windi et al., 2013; Jaka et al., 2016).

The ABO blood group contains antigens on red blood cellular surfaces that may confer advantage of resistance against some infectious disease (Christian et al., 2018). According to blood groups as illustrated in Table 4, the rate of *H. pylori* infection was significantly higher for type O blood (35.83%) compared to other blood types (A = 29%, B = 17.46%, and AB = 10.42%) ( $P = 0.002$ ). This study revealed that patients with O blood group were higher prone to infection and AB blood group lower to infection. This result was corresponding to other studies that manifesting the greater sensitivity of O blood group to *H. pylori* infection (Tdege et al., 2005; Abdulridha, 2013; Reisi et al., 2017; Christian et al., 2018) and opposed with some former studies which explained that the O blood group did not act as a risk factor for *H. pylori* infection (Zhubi et al., 2011; Shaldoum, 2015; Muhemmed and Mohammed, 2016).

The rhesus blood group is an immunological important blood group system second to the ABO blood group (Christian et al., 2018). Regarding the association with rhesus factors [Table 5], our results found that a higher infection rate (30.77%) was associated with Rh-negative compared to Rh-positive (25.67%) ( $P = 0.500$ ). These results were consistent with other studies that reported an association with Rh-negative (Zhubi et al., 2011; Hwaid et al., 2013), and inconsistent with other studies which documented an association with Rh-positive (Abdulridha, 2013; Shaldoum, 2015; Baqir et al., 2016; Reisi et al., 2017).

## CONCLUSION

We concluded that the prevalence of *H. pylori* infection rate was higher among patients with gastroenteritis in Erbil city. Furthermore, it can be concluded that females and patients from rural area are more prone to *H. pylori* infection ( $P < 0.05$ ), but there is no significant relationship between *H. pylori* infection and age groups ( $P > 0.05$ ). The proportion of this bacterial infection was revealed in patients with blood group O more than others ( $P < 0.05$ ), while no significant differences between rhesus positive and rhesus negative patients were observed ( $P > 0.05$ ).

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