# Seroprevalence of *Helicobacter Pylori* among Human in Erbil and Rania City, Kurdistan Region, Iraq

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## Abstract

**Background:** More than half of the world's population is influenced by *Helicobacter pylori* infection. The infection is commonly obtained during childhood but may stay asymptomatic, with long-term clinical consequences such as gastritis, peptic ulcer, and stomach cancer.

**Aim:** To determine the prevalence rate of *Helicobacter pylori* infection and related variables such as gender, and seasonal variation in Erbil and Rania cities.

**Materials and methods:** In a retrospective study the information was gathered by reviewing laboratory records of 1626 patients. Of the total 1126 records from Razgary hospital in Erbil and 500 records from Rania hospital. Antibodies to *H. pylori* were identified by rapid immunological examination.

**Results:** The overall seroprevalence rate of *Helicobacter pylori* infection was 42.19% (686/1626) in all samples tested from both cities. In addition, the *H. pylori* seroprevalence was 37.92% in Erbil and 51.8% in Rania and the difference was highly significant ($X^2$ = 27.198; P=0.00001). The seroprevalence was higher in male in Erbil [Male (44.15%) and female (32.85%)], while in Rania the prevalence was higher in female (69% for female and 37.5% for male). The highest rate of prevalence of *H. pylori* antibodies was in April (43.75%) and November (43.22%), while the lowest rate was found in September (0%) in Erbil city. In Rania city the highest rate of prevalence of *H. pylori* antibodies was in June (69.2%) and May (67.7%) while the lowest rate was found in February (34.1%).
**Conclusion:** The present study results warranted conduction of large scale study in order to confirm the local variation in *H. pylori* prevalence within Iraqi community.
**Keywords*: H. Pylori,* seroprevalence, Kurdistan region, Iraq**

## Introduction

*Helicobacter pylori* (*H. pylori*) is one of the most common chronic bacterial infections worldwide, which infects at least 50% of world's human population. There is evidence that acquisition of *H. pylori* occurs mainly in early childhood. The infection is more prevalent in developing countries, and it is associated with poverty and social deprivation and main risk factors include overcrowded households, poor sanitation, and poor water supply [1].

The genus Helicobacter belongs to the family Helicobacteraceae, order Campylobacterales, subdivision of the Proteobacteria. This family also includes the genera Wolinella, Flexispira, Sulfurimonas, Thiomicrospira, and Thiovulum. To date, the genus *Helicobacter* comprises of 32 validly reported species. *Helicobacter pylori* are the type species. Members of this family are able to colonize various ecological niches in the gastrointestinal tract in both humans and a broad range of animal hosts [2].

*Helicobacter pylori* was implicated as underlying etiology for the development of gastritis, peptic ulcer and stomach carcinoma [3-5] in Iraqi community. Recent studies performed in Iraq indicated abnormalities in many biomarkers [3-6] and this may suggest that

these biomarkers abnormalities may play a role in the pathogenesis and initiation of stomach cancer.

The relative risk of gastric carcinoma is 2.3–8.7 times greater in infected adults as compared to uninfected subjects. *H. pylori* is classified by the World Health Organization as a Group I carcinogen [7]. In Iraq, a new 3 variants were isolated and sequenced from gastritis, peptic ulcer and stomach carcinoma biopsies and thus the study indicated that genetic variation in *H. pylori* was correlated to gastritis severity and was more in gastric cancer cases as compared to gastritis and peptic ulcer. [5].

*Helicobacter pylori* cause's gastroduodenal infections in human and infection with *H. pylori* is highly prevalent globally and nearly half the population of the world is affected [8]. *H. pylori* is Gram-negative, helical-shaped, microaerophilic, oxidase, catalase, and urease-positive bacterium which usually colonize the human stomach [9]. The Production of ammonia by this bacteria and release of biochemicals such as proteases, vacuolating cytotoxin A and phospholipases contribute significantly to its inflammatory and carcinogenic potential [9].

Infections with *H. pylori* are believed to happen soon in life and the infection involves several medical circumstances including gastritis, gastric cancer, gastric adenocarcinoma, lymphoma and peptic ulcer [10]. Patients with *H. pylori* infection are generally asymptomatic and no particular clinical signs and symptoms were outlined. Common signs and symptoms, however, include nausea, vomiting, abdominal pain, heartburn, diarrhoea, evening starvation and bad breath [11].

The epidemiological evidence has shown that *H.pylori* infection rates ranging from 20- 50% in the adult populations of the developed world but the occurrence is much more in the developing countries with prevalence as high as 90% in some countries [9-11]. The socioeconomic status of the family during childhood appears to be the major marker of infection. Higher prevalence exists in regions of low socioeconomic and poor sanitary conditions, and in rural as contrasted to urban areas. Overcrowding is a risk factor for acquisition of *H.pylori* infection in children. Contaminated water and food also act as sources of infection [12].

There are several techniques for diagnosing *H. pylori* infection that are invasive or noninvasive. The invasive method includes

endoscopy and biopsy [histological examination, Rapid Urease Test], and Polymerase Chain Reaction. Non-invasive methods include the Urea Breath Test, stool antigen testing, and serological tests [13]. One of the serological techniques is an immunochromatographic technique which is commonly used for the diagnosis of *H. pylori* because of its low cost and easy availability at any laboratory [14]. Thus this study was conducted to determine the seroprevalence of *H. pylori* among patients with gastroduodenal disorders and its association with some of the epidemiological variables in Erbil and Rania cities in Kurdistan region, Iraq.

**Methodology**

A retrospective study and the information was gathered from laboratory records from Razgary hospital in Erbil city and Rania hospital in Sulaymanyia Governorate), including anti *Helicobacter pylori* antibodies. The study covered the period from 1st January, 2019 to 1st December, 2019. The data presented as frequency and percentages and $X^2$ was used to determine the significance of differences. The study included 1626 laboratory records, of them 1126 records from Erbil and 500 records from Rania. The research protocol was approved by Akri College of Education Ethical Committee, Duhok University and Duhok Health Authority.

**Result and discussion**

The overall seroprevalence rate of *Helicobacter pylori* infection was 42.19% (686/1626) in all samples tested from Erbil and Rania cities. In addition, the seroprevalence rate of *H. pylori* antibodies was 37.92% (427/1126) in Erbil and 51.8% in Rania and the difference was highly significant ($X^2$ = 27.198; P=0.00001), Tables 1 and 2. In Erbil, the seroprevalence was higher in male (44.15%) than in female (32.85%)], Table 1. While in Rania the seroprevalence was higher in female (69%) than in male (37.5%), Table 2. There was a significant difference ($X^2$ = 10.03; P< 0.01) in *H. pylori* seroprevalence between two cities according to gender. AL-Mashhadani, *et al*., [15] in a study conducted in Iraq reported *H. pylori* seroprevalence of 39.4%, which is lower to that of the present study.

The present study results indicated that *H.pylori* antibodies highest seroprevalence was in April (43.75%), November (43.22%), and December (41.17%), while the lowest rate was found in September (0%), March and January (32.78%) in tested samples from

Erbil, Table 3. However, the monthly seroprevalence differences were not significant ($X^2 = 6.7$; $P>0.05$).

In Rania the seroprevalence of *H. pylori* was 51.8% (259/500) and it was higher in female (69%; 156/226) than in male (37.5%; 103/274), Tables 2. The seroprevalence *H. pylori* was higher in June (69.2%), May (67.7%) and March (62.2%), while the lowest rate was found in February (34.1%) and January (34.78%), Table 4. The frequency distribution of positive seroprevalence was with significant differences when analysed according to months strata ($X^2 =25.98$; $P= 0.007$).

Serological tests are more universally used, and it is the most practical method available to confirm diagnosis. *Helicobacter pylori* antibodies rapid test is used to monitor human sera in different hospital and laboratory settings. This test is the easiest methods to apply and the most globally used for recognizing antibodies of infection with *H. pylori* [16]. The prevalence of *H. pylori* among patients in Rania city (51.8%) significantly higher ($X^2 = 27.198$; $P=0.00001$) than in Erbil (37.92%) city. However, this finding needs to be confirmed in a large scale community-based and hospital-based comparative study.

Previous study in Iraq [15] indicated that the seroprevalence of *H. pylori* was 39.4% for all tested samples, and the rate of infection among female was 40.7% and in male was 38.2%, a finding that was consistent with that of Rania in this study. As well as, the result of our study in Rania city (male 37.5% and female 69% ) were agreed with the finding of Mohamed *et al*.[17], which performed in Sulaymanyia. They reported an *H. pylori* infection rate of 42.3% in male and 57.7% in female. [17]. Mohialdeen et al., [18] indicated that history of *H. pylori* infection was observed in 63.2% of the patients with gastric cancer. Moreover, prevalence of gastric cancer was more among females (61.5%).

The present study result was inconsistent with that reported by Salih [19] in Saudi Arabia who found the prevalence of *H.pylori* infection was 75%. The prevalence of *H.pylori* among humans in Erbil city showed a less rate compared with that reported from other studies in some developing countries [19-22]. Bani-Hani and Hammouri [20] in Jordan reported that the prevalence of *H.pylori* infection was 82 %. Perez-Perez et al. [21] mentioned that the prevalence of *H.pylori* infection among patients underwent upper

gastrointestinal endoscopy in Yemen, Sana'a major hospital, was very high (78%). Also Sasidharan et al. [22] in Malaysia reported high prevalence of *H. pylori*.

Although the seroprevalence of *H.pylori* was lower than that reported for some geographical areas, however, it was higher than that reported for Australia 21.5% [23] and Oman (25%) [24]. In addition, a recent study conducted by Shu et al. [25] showed that the prevalence of *H.pylori* infection was 3.1 % and 18.6 % in Japan and China respectively. The variability in the occurrence rate of *H.pylori* infection could be due to poor social and economic development, differences in socioeconomic condition, poor hygiene practices during childhood; absence of a sewage disposal facility during childhood; standard of hygiene and source of drinking water, also low education level; crowded families; and improper food handling [15]. Higher incidence exists in regions of low socioeconomic and poor sanitary conditions, and in rural as contrasted to urban areas. The socioeconomic status of the family during childhood appears to be the major marker of infection [26,27]. The monthly variation in *H. pylori* seroprevalence during the study period may be due to climate influence on the bacteria growth.

In conclusion, the present study indicated significant differences in seroprevalence of *H. pylori* between Erbil and Rania. The study results warranted conduction of a large scale study in order to confirm the local and seasonal variation in *H. pylori* prevalence within Iraqi community.

**Table.1. Prevalence of *H. Pylori* antibodies according to gender in Erbil city.**

| Gender | Number of samples tested | Positive | | Negative | |
|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent |
| **Male** | **505** | **223** | **44.15** | **282** | **55.84** |
| **Female** | **621** | **204** | **32.85** | **417** | **67.14** |
| **Total** | **1126** | **427** | **37.92** | **699** | **62.07** |

**Table.2. Prevalence of *H. Pylori* antibodies according to gender Rania city.**

| Gender | Number of samples tested | Positive | | Negative | |
|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent |
| Male | 274 | 103 | 37.5 | 171 | 62.4 |
| Female | 226 | 156 | 69 | 70 | 30.9 |
| Total | 500 | 259 | 51.8 | 241 | 48.2 |

**Table. 3. Seroprevalence of *H. Pylori* antibodies according to month of the year in Erbil city.**

| Month | Number of samples examined | Positive | | Negative | |
|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent |
| January | 183 | 60 | 32.78 | 123 | 67.21 |
| February | 123 | 45 | 36.58 | 78 | 63.41 |
| March | 0 | 0 | 0 | 0 | 0 |
| April | 96 | 42 | 43.75 | 54 | 56.25 |
| May | 135 | 47 | 34.81 | 88 | 65.18 |
| June | 50 | 18 | 36 | 32 | 64 |
| July | 168 | 62 | 36.90 | 106 | 63.09 |
| September | 4 | No | No | 4 | 100 |
| October | 127 | 51 | 40.15 | 76 | 59.84 |
| November | 155 | 67 | 43.22 | 88 | 56.77 |
| December | 85 | 35 | 41.17 | 50 | 58.82 |

**Table.4. Seroprevalence of *H. Pylori* antibodies according to month of the year in Rania city.**

| Month | No. of samples examined | Positive | | Negative | |
|---|---|---|---|---|---|
| | | No. | % | No. | % |
| January | 46 | 16 | 34.78 | 30 | 65.2 |
| February | 41 | 14 | 34.1 | 27 | 65.8 |
| March | 61 | 38 | 62.2 | 23 | 37.7 |
| April | 56 | 33 | 58.9 | 23 | 41 |
| May | 31 | 21 | 67.7 | 10 | 32.2 |
| June | 39 | 27 | 69.2 | 12 | 30.7 |
| July | 42 | 25 | 59.5 | 17 | 40.4 |
| August | 30 | 15 | 50 | 15 | 50 |
| September | 28 | 12 | 42.8 | 16 | 57.1 |
| October | 37 | 16 | 43.2 | 21 | 56.7 |
| November | 43 | 20 | 46.5 | 23 | 53.4 |
| December | 46 | 22 | 47.8 | 24 | 52.1 |

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