

# Prevalence of *Helicobacter pylori* and Its seasonality in Ilam, Iran

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## Abstract:

The epidemiology of *Helicobacter pylori* (*H. pylori*) infection in Ilam city, Western Iran, is not well understood. We conducted the current research to determine the seroprevalence of *H. pylori* infection in this city. A total of 1102 individuals (661 females and 441 males) older than 12 years old were enrolled in the study. The bacterium was detected by the *H. pylori* stool antigen (HpSA) test. The rate of *H. pylori* positivity in the sample population was 54.4% (n=600). No statistically significant association was found between gender and the prevalence of *H. pylori* ( $P$  value = 0.21). The highest *H. pylori* prevalence was observed in the summer (17.6%, n= 194); however, no statistically significant relationship was detected between seasonal changes and the incidence of *H. pylori* infection ( $P$  value= 0.30). According to our results, it seems that the prevalence of *H. pylori* infection is high, especially in summer, in the population of Ilam city. This may become a major health concern in the area.

**Keyword:** *Helicobacter pylori*, Stool antigen method, Gastrointestinal problems, Seasonality

## 1. Introduction

*Helicobacter pylori* (*H. pylori*) is an important Gram-negative bacterium categorized as a type 1 carcinogen due to its role in development of gastric cancer (Amin *et al.*, 2019). Although the colonization of *H. pylori* in the stomach causes many gastrointestinal disorders, many infected individuals remain asymptomatic (Jafarzadeh *et al.*, 2013, Fakhre-Yaseri *et al.*, 2017). Because of different socioeconomic and living conditions, significant differences were observed in the prevalence of *H. pylori* infection between countries and within the same country. Different studies from various regions of Iran demonstrated a prevalence of *H. pylori* infection higher than 85% (Farshad *et al.*, 2010, Babatola *et al.*, 2019). Several studies suggested that some microorganisms such as *H. pylori* might have seasonal distribution (Yuan *et al.*, 2015). Therefore, the present research was conducted to determine the prevalence of *H. pylori* infection across different seasons among the residents of Ilam city, western Iran.

## 2. Materials and Methods

### 2.1. Patients and samples:

Our study was performed on 1102 patients visiting our clinical laboratory (Khorshid Clinical Laboratory, Ilam, Iran) from February 2017 to January 2020. The *H. pylori* stool antigen (HpSA) test was performed for the patients. All the patients were older than 12 years. Stool samples were collected and kept at -20°C until use.

### 2.2. HpSA test:

The presence of *H. pylori* antigen in stool was checked using the HpSA test, a polyclonal ELISA assay (Generic Assays, Germany). First, all the components of the test were allowed to reach room temperature. Briefly, diluted stool samples (0.5 ml diluent+100 g stool) and antibody-biotin conjugates were added to wells and instantly incubated at room temperature for 60 minutes. Then the wells were decanted and washed before adding streptavidin-HRP conjugate and again incubated at room temperature for 30 minutes. Afterwards, the wells were decanted and washed, and chromogen substrate was added to each well. Finally, after adding the stop solution, the absorbance of samples was recorded at 450/620 nm by spectrophotometry (STAT FAX 4300, USA).

### 2.3. Statistical analysis

The Chi square and Fischer's exact tests were applied to check any association between the variables considering a  $P$  value of < 0.05 as the significance level.

## 3. Result

A total of 1102 individuals older than 12 years (661 females and 441 males) were investigated. *H. pylori* positivity was observed in 54.4% (n=600) while 45.6% (n=502) of the samples were negative. Gender was not significantly associated with the prevalence of *H. pylori* infection ( $P$  value= 0.21, table 1).

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**Table 1.** Association between gender and prevalence of *H. pylori* infection

HpSA test	Sex		Total N=1102 n (%)	P value
	Female N=661 n (%)	Male N=441 n (%)		
Negative	291 (26.4%)	211 (19.1%)	502 (45.6%)	P value= 0.21
Positive	370 (33.6%)	230 (20.9%)	600 (54.4%)	
Total	661 (60%)	441 (40%)	1102 (100%)	

**Table 2.** The prevalence of *H. pylori* according to seasons

HpSA test	Season				Total	P value
	Spring	Summer	Autumn	Winter		
Negative	122 (11.1%)	158 (14.3%)	111 (10.1%)	111 (10.1%)	502 (45.6%)	P value= 0.30
Positive	145 (13.2%)	194 (17.6%)	140 (12.7%)	121 (11%)	600 (54.4%)	
Total	267 (24.2%)	352 (31.9%)	251 (22.8%)	232 (21.1%)	1102 (100%)	

#### 4. Discussion

*H. pylori* infection can cause serious human disorders (Karimi *et al.*, 2013). It is estimated that *H. pylori* has already infected half of the world's population (Landarani *et al.*, 2014, Sedaghat *et al.*, 2014). Various noninvasive methods (e.g. urea breath test, HpSA, and highly accurate serological tests) are available for *H. pylori* diagnosis (Korkmaz *et al.*, 2015). Among these, the HpSA test is an easy, rapid, and inexpensive diagnostic method in clinical settings (Ceken *et al.*, 2011, Khalifehgholi *et al.*, 2013). The HpSA test directly detects the antigen of *H. pylori* in stool (Stefano *et al.*, 2018). Using this test, *H. pylori* frequency in our study was obtained 54.4%. Our observed prevalence was relatively high compared to the studies of Sharbatdaran *et al.* (2013, 37.7%) (Sharbatdaran *et al.*, 2013), Dalla Nora *et al.* (2016, 49%) (Dalla Nora *et al.*, 2016), Seid *et al.* (2018, 30.4 %) (Seid and Demsiss, 2018), Shiferaw *et al.* (2019, 36.8%) (Shiferaw and Abera, 2019), and Khoder *et al.* (2019, 41%) (Khoder *et al.*, 2019). However, our result was similar to that of some other studies, for example Bashiri *et al.* (2019, 74%) (Bashiri *et al.*, 2019), who reported a high frequency for *H. pylori* infection.

In the current study, the frequencies of *H. pylori* infection in females and males were 61.67% (n= 370/600) and 38.33% (n= 230/600), respectively. Agbor *et al.* (2018) reported an overall rate of 47.4% for *H. pylori* infection and respective frequencies of 47.0% and 47.5% in males and females. In the current study, there was no statistically significant association between gender and *H. pylori* infection. In this regard, our results were similar to those of Hajifattahi *et al.* (Hajifattahi *et al.*, 2015), Basir *et al.* (Ghasemi Basir *et al.*, 2017), and Tameshkel *et al.* (Tameshkel *et al.*, 2018) who reported no significant associations between gender and *H. pylori* infection.

Assessing the effects of seasonal patterns on the incidence of *H. pylori* infection, we observed no statistically significant association between *H. pylori* seroprevalence and seasons. Raschka *et al.* (1999) described a remarkable surge in *H. pylori* positive cases in October (i.e. fall); nevertheless, they reported that gender did not significantly influence the incidence of the infection. Moreover, Ibrahim *et al.* (2019) noted an elevated risk of *H. pylori* infection in January (winter).

The highest rate of the infection was observed in the summer (17.6%, n=194); however, there was no statistically significant pattern in the seasonal distribution of the infection (P value= 0.30, table 2).

In general, the discrepancies between our results and those of other studies may be due to (1) differences in the socio-economic and health status of participants (e.g. the availability of healthy sources of drinking water, and participants' knowledge about *H. pylori* transmission routes) (Wang *et al.*, 2019), (2) the presence of different bacterial strains in different geographical areas, may limit the diagnostic efficiency of some commercial diagnostic tests (Ghorbani *et al.*, 2009), and (3) other etiological and individual-specific features (for example dyspepsia) that can affect the prevalence of *H. pylori* infection (Suzuki *et al.*, 2011).

The HpSA test may deliver false-negative results in patients with low-intensity colonization and low fecal concentration of *H. pylori*. Also, false-positive results may occur due to cross-reactions with other *Helicobacter* species (Darma *et al.*, 2019). Nonetheless, this method can be used as a routine approach in clinical setting in Iran. In conclusion, the current study provided valuable information about the high prevalence of *H. pylori* infection, especially in summer season, in Ilam city that should be considered as a major health concern. Furthermore, this data can be useful for health decision makers and epidemiologists to conduct further studies.

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#### Conflicts of Interest:

The authors declare that there is no conflict of interest regarding the publication of this article.

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