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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 than12 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%)	

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).

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%)	
Positive	145 (13.2%)	194 (17.6%)	140 (12.7%)	121 (11%)	600 (54.4%)	*P* value= 0.30
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).

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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