

Prevalence of *Helicobacter Pylori* Infection in Patients with Digestive Complaints Using Urea Breath Test in Mashhad, Northeast Iran

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ABSTRACT

Background: *Helicobacter pylori* infection is the most common gastrointestinal bacterial disease worldwide. Although using culture is considered as the golden standard method for diagnosis of *H. pylori* infection, urea breath test is a notable alternative method because it is an easy, quick, and non-invasive approach. The aim of this study was to estimate the prevalence of *H. pylori* infection in patients with digestive discomforts using urea breath test in Mashhad County, northeast of Iran.

Methods: The study involved 814 patients, 467 women and 347 men, aged 17-80 years, with gastrointestinal symptom from January 2007 to November 2008. The urea breath test was performed and the patients ingested a solution of isotope labeled urea. The expired air was collected and was analyzed using the Heliprobe breath card (Noster System, Stockholm, Sweden).

Results: The results of the test were positive for 698 out of 814 (85.75%) patients including 403 (86.30%) of women and 295 (85.01%) of men. However, the difference between the two groups was not statistically significant. Positive cases were classified by age. The highest prevalence rate of *H. pylori* infection was observed among 50-60 years old patients.

Conclusions: The infection of *H. pylori* is very common among patients who have gastric complain and can be easily diagnosed by noninvasive urea breath test. Since *H. pylori* infection is related to poor prognosis outcomes such as gastric cancer. Therefore, screening and treatment of infected people especially symptomatic cases using urea breath test is a priority.

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Introduction

Helicobacter *pylori* infection is the most common gastrointestinal bacterial disease worldwide which is associated with gastritis, peptic and duodenal ulcers and gastric adenocarcinoma¹.

H. pylori infection is usually detected through endoscopic and histological evaluations using culture or urease tests

(invasive tests). However, there is an alternative noninvasive test using labeled carbon urea breath test (no radioactive ¹³C-UBT and radioactive ¹⁴C-UBT) and serological examinations². All biopsy-based methods are liable sampling error due to some reasons. Up to 14% of patients with *H. pylori* will not have antral infection but will have *H. pylori*

elsewhere in the stomach, especially if there is gastric atrophy, intestinal metaplasia or bile reflux. In addition, after partially effective eradication therapy low levels of recurrent infection can be easily missed by biopsy. For these reasons, taking multiple biopsies from the antrum and corpus for histological evaluation and as well as culture or urease testing is recommended^{3,4}.

Urea breath test (UBT) is a rapid diagnostic procedure used to identify *H. pylori* infections. This organism produces a powerful urease, which provides the basis for its detection in this test⁵. The sensitivity and specificity of the test were estimated 97% and 95%, respectively^{6,7}. In urea breath test, labeled carbon dioxide in exhaled breath is collected and measured by different instrumentation. Isotope labeled carbon dioxide shows that the urea has been split. The hydrolyzed labeled urea indicates the presence of *H. pylori* bacteria in the stomach.

As there was no accurate information about the prevalence of *H. pylori* infection in Mashhad, this study was conducted on patients with digestive discomfort referred to a clinic in Mashhad to determine the prevalence of *H. pylori* infection using non-invasive urea breath test.

Materials and Methods

In this cross-sectional study, 814 patients aged 17–80 years whose chief complain was digestive discomfort (stomachache, flatulence, heartburn, reflux and epigastric pain) were examined for *H. pylori* infection from January 2007 to November 2008. In this research, 347 male and 467 female patients who referred to Hamun Clinic in Mashhad Country, the north east of Iran, were tested.

Diagnostic experiments were performed by Heliprobe ¹⁴C-UBT (Noster System, Stockholm, Sweden). Heliprobe 1 micro Curie ¹⁴C was given to the patients as either a capsule or solution in water. After 10-15 min, the patients were asked to blow into the Helicoprobe breathcard. A color change in breath cards indicated that a sufficient volume of CO₂ was collected. Then breath cards were analyzed by the Heliprobe analyzer (b-

scintillation counter). Infection status was determined by the number of detected ¹⁴C counts per measurement (CPM). The results were categorized in three grades including grade 0 (CPM≤25), grade 1 (CPM 25-50) and grade 2 (CPM ≥50). Grade 0 was considered as negative (uninfected by *H. pylori*), Grade 1 as borderline, and Grade 2 as positive (infected by *H. pylori*).

Statistical analysis of the results was carried out using SPSS version 15 software. Chi-square test was used for subgroup analysis. The p<0.05 was considered statistically significant.

Results

The result of urea breath test was positive for 698 out of 814 (85.75%) patients. Accordingly, the prevalence of *H. pylori* infection was 86.30% in women (403/467) and 85.01% in men (295/347). There was no statistically significant difference between the two groups. Table 1 shows the results of urea breath test for diagnosis of *H. pylori* by sex and age. According to these findings, the prevalence rate of *H. pylori* infection was highest among 50-60 years old patients. The prevalence rate of infection was highest in men aged 40-50 years and in women aged 50-60 years. The prevalence of *H. pylori* infection was nearly the same among all age groups

Discussion

Since *H. pylori* is related to many poor prognostic outcomes such as gastritis, peptic ulcer, and stomach adenocarcinoma, the diagnosis and treatment of infected people especially symptomatic cases should be the focus of special attention. The ¹⁴C-UBT is widely used for diagnosis of gastric *H. pylori* infection. This method is simple, easy to repeat, reliable, non-invasive, and economic⁸. UBT is a highly sensitive and specific test compared to invasive methods used for *H. pylori* diagnosis. The sensitivity and specificity of ¹⁴C-UBT were estimated 98% and 91% by Rasool and et al.⁹. This test is widely used to screen patients before endoscopy and to assess the success of therapies aimed at eradicating *H. pylori*¹⁰⁻¹². In addition, this test could be very important diagnostic tool in the high *H. pylori* prevalence

areas¹² and less developed countries⁹. Since the biological half-life of urea is short, the cumulated radiation does from each breath test is small and far below radiation in natural radiation¹².

Gomollon et al. reported the prevalence of *H. pylori* infection 72% in Spain. According to this study, the UBT test was much more sensitive (97%) and specific (100%) than other

conventional tests including enzyme immuno assay (EIA), rapid urease test, histology and culture¹³. UBT was positive in 27.4% of school students with abdominal pain in Makkah, Saudi Arabia¹⁴. 17.7% of children infected with HIV-1 were positive *H. pylori* infection based on serology findings, whereas 20% of them were positive using ¹³C-UBT¹⁵.

Table 1: The results of urea breath test for diagnosis of *H. pylori* infection among the patients with digestive complaint by age and sex

Age groups	Proportion of <i>H. Pylori</i> infection (%)		
	Women	Men	Total
17-20	22/28 (78.6)	10/13 (76.9)	32/41 (78.0)
21-30	69/88 (78.4)	67/79 (84.8)	136/167 (81.4)
31-40	114/126 (90.5)	102/119 (85.7)	216/245(88.2)
41-50	104/114 (91.2)	60/69 (87.0)	164/183 (89.6)
51-60	51/55 (92.7)	24/28 (85.7)	75/83 (90.4)
61-70	21/27 (77.8)	17/21 (81.0)	38/48 (79.2)
71-90	10/14 (71.4)	7/9 (77.8)	17/23 (73.9)
Unknown ^a	12/15 (80.0)	8/9 (88.9)	20/24 (83.3)
Total	403/467 (86.3)	295/347 (85.0)	698/814 (85.7)

^a The age of 24 patients (15 women and 9 men) was unknown.

Logan and colleagues reported that bacterial culture of *H. pylori* was not a sensitive approach. However, this conclusion may be partly due to sampling error and technical difficulties associated with culture⁵.

“A previous study conducted in Mashhad estimated the prevalence rate of *H. pylori* infection 62.56% in patients with digestive complaints using direct stain, urease and culture method”¹⁶ while the present study estimated the prevalence of *H. pylori* infection much more (87.75%) in the similar population using ¹⁴C-UBT. The ¹³C-UBT and ¹⁴C-UBT are now considered as the gold standard techniques for the detection of *H. pylori* infection¹⁷. Pathak et al. evaluated the efficacy and safety of ¹⁴C-UBT for the detection of *H. pylori* infection in children without any fear of ‘radiation phobia’ where ¹³C-UBT was unavailable¹⁷.

Conclusion

The *H. pylori* infection is considerably common among patients who have gastric complain and is easily diagnosed by noninvasive urea breath test. On the other hand, *H. pylori* infection is related to many poor prognosis outcomes such as peptic and/or duodenal ulcer as well as gastric cancer. Therefore, screening and treatment of infected people especially symptomatic cases using urea breath is a priority.

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Ethical Approval

This research was conducted in accordance with ethical principles on clinical specimens and all patients filled out an informed consent.

Conflict of interest statement

The author declares that she has no conflicts of interest.

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