Role of Helicobacter Pylori stool antigen test in the diagnosis of Helicobacter Pylori infection

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Abstract

Introduction: Helicobacter pylori (H. pylori) infection is common in developing countries. There are various invasive and non-invasive methods for diagnosing H. pylori infection. Stool antigen test is a new non-invasive method to diagnose H. pylori infection. In this study we evaluated the diagnostic accuracy of HpSA for H. pylori infection in patients with gastrointestinal (GI) complaints.

Methods: Sixty patients including 28 men and 32 women with mean age of 49.2 ± 19.8 years undergoing diagnostic endoscopy with 30 positive and 30 negative rapid urease test (RUT) and histology results for H. pylori infection were evaluated. H. pylori stool antigen test (HpSA) was measured in these patients and sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy for HpSA were calculated.

Results: Among 31 positive HpSA results, 2 were negative in RUT and histology and among 29 negative HpSA results, 1 was positive in RUT and histology results. Sensitivity, specificity, PPV, NPV and accuracy for HpSA in diagnosing H. pylori infection were 96.67%, 93.33%, 93.55%, 96.55% and 95%, respectively.

Conclusion: Although the sensitivity and specificity of the HpSA are evaluated in a relatively small sample size, these results showed that HpSA is a useful test in diagnosing H. pylori infection in patients with upper GI complaints.

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Introduction

Helicobacter pylori (H. pylori) infection is observed in less than 60% of population in developed countries and more than 90% of normal individuals in developing countries especially in Middle East region.[1-3] H. pylori is shown to have role in the pathogenesis of some gastrointestinal (GI) diseases including gastritis, peptic ulcer disease and gastric cancer.[4-7] The accurate diagnosis of the infection is imperative for better management and to prove its eradication following treatment. H. pylori infection could be assessed by invasive and noninvasive methods. Invasive tests require gastric tissue or mucus for histology and culture.[8-10] However, there is an increased interest toward non-invasive tests which only require blood, breath or stool for analysis. These include serological methods, urea breath test, and H. pylori stool antigen test (HpSA).[8-12]

HpSA is a simple, easy and useful method which uses polyclonal or monoclonal antibody-based techniques[6,10-12] and is recommended for confirming both diagnosis and eradication.[6,13]

HpSA is simple, fast and inexpensive analytical process which could be easily obtained at home (only stool sample is needed) and does not require laboratory attendance or fasting.[10-12]

The H. pylori infection prevalence is very high among the Iranian general population.[1] There are studies evaluating the accuracy of

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HpSA for detection of H. pylori in children[14,15] and hemodialysis patients,[12,16] but studies about HpSA accuracy in adults with GI complaints in Iran are few.[10,11,17] Here, we examined the role of HpSA in diagnosing H. pylori infection in patients with upper GI complaints.

Methods

In this prospective study, H. pylori infection was evaluated using HpSA in patients with upper GI complaints undergoing diagnostic endoscopy. For this purpose, 30 patients with positive rapid urease test (RUT) and histology results for H. pylori infection and 30 patients with negative test results were selected. The study was powered to detect an effect size of d ≥ 0.50 as statistically significant in a two-tailed test with α = 0.05 and power of 0.80 with n = 30 per condition.

Patients with clinical features of gastroesophageal reflux disease (GERD), GI bleeding during endoscopy, active GI bleeding, pregnancy, breast-feeding and history of partial or complete gastrectomy and those who received proton pump inhibitors (PPIs), antibiotics or H_2 receptor blockers within the past 4 weeks and bismuth for 2 weeks before beginning of the study and those with prior H. pylori eradication therapy or gastric carcinoma were excluded. Patients receiving immunosuppressive agents were also excluded.

The pathologist evaluating the stool samples was unaware of endoscopy results. Stool samples were collected and stored at –20 °C until analyzed. A polyclonal enzyme-linked immunosorbent assay (ELISA) stool antigen test (Astra S.r.l, Milan, Italy) was used to detect H. pylori in the frozen stool, according to manufacturer's instructions. A diluted feces sample and a peroxidase conjugated to antibody were added to the wells and incubated for 1 hour at room temperature and sample wells were washed to remove unbound samples and enzyme-labeled antibodies. The results were read at 450/620 nm by spectrophotometry.

All statistical tests were performed using SPSS for windows (version 17, SPSS Inc., Chicago, IL, USA). Quantitative data were presented as mean ± standard deviation (SD), while qualitative data were demonstrated as frequency and percent. The value of HpSA in diagnosing H. pylori infection was evaluated by sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV).

Results

Sixty patients including 28 men and 32 women with mean age of 49.2 ± 19.8 years were evaluated. Clinical manifestations were epigastric pain (85%), regurgitation (60%), heart burn (55%) and distention (45%). Patients underwent upper GI endoscopy which was normal in 22 cases. Gastritis, erosion, bulbar ulcer and peptic ulcer were the most common findings. Pathology reported normal findings in 16.7%, chronic superficial gastritis in 35% and chronic atrophic gastritis in 46.7%.

Thirty patients were positive for H. pylori infection and 30 patients were negative based on RUT and histology results. RUT and histology findings were used as gold standard. HpSA was positive in 31 cases and negative in 29 cases. Among 31 positive HpSA results, 2 were negative in RUT and histology and among 29 negative HpSA results, 1 were positive in RUT and histology. Sensitivity, specificity, PPV and NPV for HpSA in diagnosing H. pylori infection were 96.67%, 93.33%, 93.55% and 96.55%, respectively. The calculated accuracy for HpSA was 95.00%.

Discussion

H. pylori infection is common in developing countries including Iran and the correct identification and diagnosis of this infection would lead to early diagnosis and better treatment of the infection. It can be detected by different methods. However, most accurate diagnostic methods are invasive like histology which needs endoscopy and sampling that is unpleasant for patients.[18] Recent trend in diagnosing H. pylori infection is to use non-invasive methods.

Urease breath test is the most common accepted non-invasive method. However, it has some disadvantages including the need for trained laboratory staff and fasting. HpSA is another non-invasive method with acceptable sensitivity and specificity for clinical and epidemiologic studies that its use has increased in recent years.[19]

In this study we estimated the accuracy of HpSA for detecting H. pylori infection and observed that HpSA had sensitivity, specificity, PPV, NPV and accuracy of 96.67%, 93.33%, 93.55%, 96.55% and 95.00%, respectively.

Different studies have shown different sensitivity and specificity for HpSA[10-12,14-16] according to monoclonal or polyclonal antibody-based techniques. However, the results for both techniques are variable. Kazemi et al.[11] observed stool antigen test sensitivity, specificity, PPV and NPV of 96%, 83%, 98%, 96%, respectively using a monoclonal antibody-based technique. Tamadon et al.[16] observed sensitivity, specificity, PPV and NPV of 100%, 75%, 60.9% and 100%, respectively using monoclonal antibody-based technique.

Different sensitivity and specificity for HpSA using polyclonal technique are reported. Khalifehgholi et al.[20] using polyclonal technique observed lower sensitivity and specificity for HpSA (73.9% and 86.7%, respectively) with 80% accuracy. Similar results were reported by Pourakbari et al.[10] using polyclonal antibody technique. The diagnostic values for HpSA in the study of Sharbatdaran et al.[17] using polyclonal technique were 66%, 93%, 91% and 62%, respectively. Syam et al.[21] also observed that HpSA when using polyclonal technique has sensitivity of 66.7% and specificity of 78.9%.

Some other studies using polyclonal HpSA technique has shown higher sensitivity and specificity. Falaknazi et al.[12] observed a sensitivity and specificity of 87.1% and 93.7%. Similarly, Iranikhah et al.[15] observed sensitivity of 85% and specificity of 93%. Similar to these two studies, our study showed higher sensitivity, specificity as well as accuracy for HpSA using polyclonal antibody-based technique.

Although it is reported that polyclonal antibody stool tests results are inferior to monoclonal antibody stool tests,[22] our results showed comparable results for polyclonal antibody technique. There are some explanations for these results; there are genetic variations of H. pylori strains that would lead to geographical variations in diagnostic efficacy.[23] So, it is possible that not all monoclonal antibody tests detect the same antigen and their usefulness should be tested in general population of a region and then be used as diagnostic test. In the absence of accuracy studies based on the population of each region, using polyclonal antibody stool antigen test seems to yield better results.

However, monoclonal or polyclonal, the test results may be affected by some other factors. It is shown that the accuracy of HpSA is lower in the unformed or watery stool samples, which may dilute the H. pylori antigen in the stool. Lower sensitivity for HpSA is also shown in patients with upper GI bleeding.[24] In order to limit these possibilities, we excluded GI bleeding patients as well as patients with diarrhea which makes our results more accurate. However, the limitation of the study was the small number of cases.

Conclusion
In conclusion, the results showed that HpSA is useful in diagnosing H. pylori infection in patients with upper GI complaints. However, due to relatively small sample size, the results of this study should be used cautiously. Further studies are needed to evaluate the HpSA accuracy in normal population of this region.

Authors' Contribution
All authors have read and approved the manuscript. Behrooz Shokouhi and Amir Vahedi performed the data collection,

writing, critical revision and drafting of the manuscript. Tala Pourlak and Behrooz Shokouhi contributed in the study design and performed the statistical analysis, data analysis and data interpretation.

Conflict of Interest
Authors have no conflict of interest.

Ethical Approval
The study protocol was approved by the research Ethics Committee of the Ardabil University of Medical Sciences and informed consent was obtained from patients.

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