Original article

A Study on Helicobacter pylori Stool Antigen Test and Rapid Urease Test for PUD

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Abstract

H. pylori infection is an important medical problem in the whole world including Bangladesh. Diagnosis of the disease remains dormant. H. pylori are also related to gastric carcinoma. Early detection of H. pylori is very much important for diagnosis of the disease and successful treatment. The most reliable the non-invasive test is urea breath test. Still the test is not currently available in our country. So, it becomes necessary to validate another reliable modality of non-invasive test. To evaluate the relatively new monoclonal stool antigen test for identification of H. pylori infection in patients with peptic ulcer disease both before and after eradication therapy. And also to compare the stool antigen test with rapid urease test and histopathology of endoscopic biopsy. This quasi study was carried in a clinical pathology department of a tertiary level hospital. We included all patients with peptic ulcer disease those who were diagnosed by upper GIT endoscopy. Demographic variables and value of laboratory test including Stool antigen test, rapid urease test were studied in this study. Out of 86 patients with peptic ulcer disease, male was 65% and female was 35%. The mean age of the study subjects was 38.53 years. The true positive SAT was 63 (73.3%), false negative was 11.6%. The positive predictive values and accuracy of SAT with Histopathology were 95.45%, and 82.56% respectively. The result was statistically highly significant. Stool antigen test (SAT) is an early effective diagnostic tool like other methods for the diagnosis of H. pylori infection in our country. As the test is noninvasive, easy to perform, requiring short time and cost effective, this test will be popular to both patient and physician.

Key words: Peptic ulcer disease, stool antigen test, rapid urease test, endoscopy, pathology.
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Introduction

Helicobacter pylori (H. pylori) infection is one of the most common bacterial infections worldwide.[1] Nearly 50% of the world's populations are affected.[2] Most are asymptomatic, still 10–20% of H. pylori infected patients develop severe diseases during their lifetime including chronic gastritis, peptic ulcer disease, primary B-cell gastric lymphoma and gastric cancers.[3] World Health Organization (WHO) has designated it as type-I carcinogen.[4] Gastric urease enzyme allows the organism to colonize the acidic stomach. Urease enzyme is an important indirect biomarker for the presence of H. pylori. It is the basis of rapid urease test (RUT) and

urea breath test (UBT), and it is also used as an antigen for serological detection.[3,4] RUT use gastric biopsies or mucus placed in a device containing urea and an indicator of pH change. The UBT is easy, non-invasive, accurate, and the most widely used test for detection of active *H. pylori* infection.[3] McNulty et al. reported a clinical test for gastric biopsy urease activity to use a simple on-invasive test for confirming the presence of H. pylori.[5] The prevalence of H. pylori infection is high in Bangladesh. 60% are infected by the age of three months and 80% are infected by three years of age.[6] The prevalence among the middle-aged adults is over 80% in many developing countries and 20–50 % in the developed countries.[7] Histology, culture and rapid urease test are the

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invasive tests requiring endoscopy and biopsy. On the other hand, serology, urea breath test and stool antigen tests are the noninvasive tests.[8-9] Urea breath test is not available in our country. So, it has become necessary to validate another reliable non-invasive test that is stool antigen test. There is no previous study in our country to assess the accuracy of monoclonal SAT. SAT is an easy noninvasive test requiring shorter time and low cost. H. pylori specific stool antigen can be tested through available immunochromatographic strip. The test is specific and reliable, may be an alternative to urea breath test. This study was aimed to evaluate the efficacy of this relatively new non-invasive diagnostic modality of SAT for H. pylori infection.

Patients and Methods

This quasi experimental study had conducted in the department of clinical pathology of Bangabandhu Sheikh Mujib Medical University (BSMMU) from October 2012 to September 2013. Study population included all clinically suspected H. pylori infected patients attending for upper GIT endoscopy. Sample size was determined by power analysis for a single proportion. We hypothesized that sensitivity of stool antigen test to predict H. pylori infection will be 90% or greater. The demographic (age, and gender) and clinical data (SAT, RUT, endoscopic biopsy for Upper GIT, and histopathological analysis) were recorded in a pre-designed data-sheet and analyzed for the study.

Statistical analysis

The stool antigen test was done from stool sample and data was recorded in tabulated form of data sheet. The rapid urease test was done with endoscopic biopsy and result was recorded in data sheet. Histopathological report for H. pylori was collected and recorded in data sheet. The stool antigen test result was compared with result of rapid urease test and histopathological report. Both histopathology and rapid urease test positive were considered as disease positive and both or either one of them negative results were considered as true negative. Thus true positive, true negative and false positive, false negative results were recorded and sensitivity, specificity, positive and negative predictive values of stool antigen test was calculated by unpaired t-test, chi square test and validity test. The whole procedure was explained to the patient and informed written consent was taken. Data were edited, cleaned and analyzed by statistical package for social science (SPSS-17.0). The test was considered significant when P value <0.05.
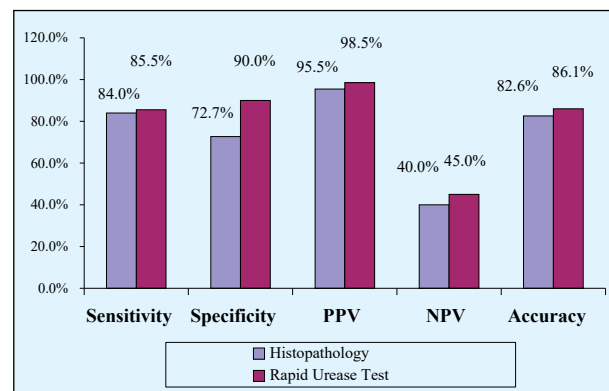
Result

We tested antigen in stool for the detection of H. pylori in 86 peptic ulcer disease patients. The majority of study subjects (32.6%) were age belonged to 31-40 years. The

Mean (±SD) age was found 38.53(±10.40) years with range from 21 to above 60 years (Table-1). The gender distribution included male (65.1%) and female (34.9%).
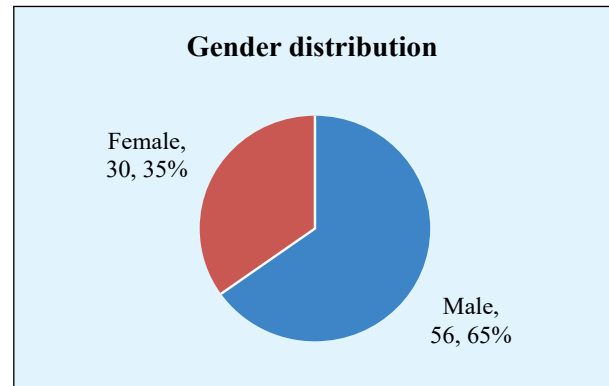
Graph 1: Gender Distribution

Graph 2: Comparison of individual sensitivity, specificity, positive predictive values, negative predictive values and accuracy of SAT with Histopathology and RUT (n=86).

Table 1: Demographic profile of the study population.

Age group	Frequency (n=86)	Percent
21-30 years	25	29.1
31-40 years	28	32.6
41-50 years	23	26.7
51-60 years	08	9.3
>60 years	02	2.3
Mean age (±SD)	38.53(±10.40)	21-64

The laboratory findings of different tests revealed that SAT, RUT, and histopathology were positive in 66 (76.74%) cases, 76 (88.37%) cases, and 75 (87.21%) cases respectively (Table-2).

Out of 86 patients, 66 were SAT positive and 20 were negative. RUT was positive in 76 and negative in 10 cases. Among positive SAT test, the true positive was 65 and false was 01 in RUT test.

Table 2: Laboratory findings of the study patients in different tests.

Tests	Number	Percentage
Stool Antigen Test (SAT):		
Positive-	66	76.74
Negative-	20	23.26
Rapid Urease Test (RUT):		
Positive-	76	88.37
Negative-	10	11.63
Histopathology:		
Positive-	75	87.21
Negative-	11	12.79

In SAT negative test, true negative was 09 and false negative was 11. Histopathology was positive in 75 and negative in 11. In SAT Positive cases, Histopathology positive was in 63 cases (true positive), and histopathology was negative in 01 case (false positive). In SAT Negative cases, histopathology was positive in 12 cases (false negative of SAT test), and histopathology was negative was in 08 cases (true negative). These findings were statistically highly significant (P<0.001) (Table-3).

Table 3: Association between SAT with RUT and Histopathology findings. (s=significant. Chi square test was done to measure the level of significance. P-value was statistically highly significant).

Test of Reference	Stool Antigen Test (SAT)		Total	P-Value
	Positive (n-66)	Negative (n-20)		
RUT:				
Positive	65	11	76	<0.001
Negative	01	09	10	
Histopathology:				
Positive	63	12	75	<0.001
Negative	03	08	11	

Out of 86 patients' sensitivity, specificity, positive predictive values and negative predictive values and accuracy of SAT with Histopathology are 84.0%, 72.73%, 95.45%, 40.0%, 82.56% respectively. On the other hand sensitivity, specificity, positive predictive values and negative predictive values and accuracy of SAT with RUT are 85.53%, 90.0%, 98.48%, 45.0%, 86.05% respectively.

Discussion

Helicobacter pylori is thought to reside normally only in the stomach [10]. H. pylori infection is usually without any symptoms, disease ranges from peptic ulcer disease (PUD), gastric adenocarcinoma to gastric MALT lymphoma and simple gastritis [11]. In this study, we compared SAT result with RUT and histopathology of endoscopic biopsy. H. pylori status was defined when both RUT and histopathology were positive and both or either one of the tests negative was considered as negative. There are many publications comparing SAT with different invasive and noninvasive tests for detection of H. pylori. But there is no known similar study done in comparing SAT with RUT and Histopathology in PUD patients in Bangladesh. In our study, the mean age is found 38.53±10.40 years with range from 21 to above 60 years and the highest incidence of PUD patients were belonged to 31-40 years. The age distribution is between 16-70 years. Of the highest incidence is aged 21-30 years and mean age is 37.98 years [12]. These finding are near similar to our study. Syam AF et al. conducted a study where they found 49.2% male-31(49.2%) and 50.8% female out of 63 patients [13]. This result differs to the gender ration in our study. In our study we compared stool antigen test with RUT and histopathology of endoscopic biopsy. Among 86 patients we found stool antigen test was positive 63 (76.74%) and negative 10 (20.00%), rapid urease test was found positive 66 (76.76%) and negative 20 (23.26%) and histopathology was positive 65(75.58%) and negative 21 (24.42%).

In our study we found the sensitivity, specificity, positive predictive and negative predictive values and the accuracy of SAT with both RUT and Histopathology were 86.3%, 77.00%, 95.45%, 50.00% and 85.00% respectively. An article mentioned the sensitivity, specificity, positive predictive and negative predictive values of SAT with both RUT and Histopathology were 69%, 86%, 92%, 53% and 92% respectively [2]. An another study found the sensitivity, specificity, positive predictive and negative predictive values and the accuracy of SAT with both RUT and Histopathology were found 94%, 90%, 93%, 92% and 92% respectively [14]. Literature reported the sensitivity, specificity, positive predictive and negative predictive values of SAT with Urea breath test were 88.0%, 87.5%, 88.0% and 87.5% respectively [15]. Another article that reported the sensitivity, specificity, positive predictive value and negative predictive value of stool antigen test with rapid urease test was 89.1%, 92.6%, 91.1% and 90.9% respectively [16]. The mentioned results are consistent with our study. In our study we found the sensitivity, specificity, positive predictive and negative predictive values and the accuracy of SAT with RUT were 85.53%, 90.0%, 98.48%, 45.0% and 86.05% respectively.

Recently many reliable methods for detecting H pylori infection are available. However, since invasive methods require endoscopy, they are not suitable for primary care physicians. In the absence of endoscopy facilities, primary care physicians require non-invasive methods to diagnose H pylori infection. SAT is an easy and quick procedure that does not require expensive equipment and

can be used as an alternative to detect H. pylori infection. As the test is noninvasive, easy to perform, requiring short time and cost effective, this test will be popular to both patient and physician.

Conclusion

Helicobacter pylori stool antigen test is accurate, relatively less expensive, easily be carried out in routine laboratory. We can conclude that it might be a non-invasive technique for the detection of H. pylori infection in PUD patients. Stool antigen test would be useful and reliable diagnostic tool for the detection of H. pylori infection in PUD patients prior to endoscopy, and it may be done where endoscopy is not available.

Limitations of the study: The study time was limited; the sample size was small, and the sample was collected from only one tertiary center that was not reflected the whole population.

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