

Correlation of Clinical and Endoscopic Findings in Patients with Helicobacter Pylori Infection using Rapid Urease Test: A 10-year Retrospective Study

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Abstract

Significance: Helicobacter pylori (HP) infection has a role in the pathogenesis of chronic gastritis, peptic ulcer and gastric malignancies. Hence, a vigilant approach is necessary to be able to determine the HP infection status of patients. We aimed to determine the current prevalence of HP infection and whether the presence of HP infection by rapid urease test (RUT) is associated with specific clinical and endoscopic findings in an urban tertiary referral hospital setting. **Methodology:** Retrospective data collection was performed on 14,806 adult patients undergoing upper endoscopy from 2009 to 2018. Patients not tested for RUT or with incomplete data were excluded from the study. Demographic profile, clinical characteristics and endoscopic findings were reviewed. Multivariate analysis of predictors of HP infection were analyzed using binary logistic regression. **Results:** A total of 10,479 patients were tested for RUT and 1,120 (11.6%) tested positive for HP infection. Among these, 575 (44.4%) were males and 645 (55.6%) were females. Patients who were HP positive were compared with HP negative patients based on clinical and endoscopic findings. On univariate analysis, patients ≥ 50 years old (70.7%) and upper gastrointestinal bleeding (15.7%) had a higher rate of HP infection ($p < 0.001$). Although dyspepsia was the most common presenting symptom in patients undergoing endoscopy, it was not more frequent among patients who were HP positive. Endoscopically, peptic ulcer disease (38.9%) and chronic atrophic gastritis (45.3%) were associated with HP infection ($p < 0.001$). On multivariate analysis, independent predictors of HP infection were peptic ulcer disease (OR=2.7, CI=0.324-0.423, $p < 0.001$), chronic atrophic gastritis (OR 1.56, CI=0.566-0.727, $p < 0.001$), gastric cancer (OR=2.04, CI=0.253-0.952, $p = 0.035$) and age ≥ 50 years (OR=1.37, CI=0.638-0.837, $p < 0.001$). **Conclusion:** The prevalence of HP infection using RUT at our institution during the last 10 years (2009-2018) was 11.6%. There was no specific symptom associated with HP infection. Age ≥ 50 years, presence of peptic ulcer, atrophic gastritis and gastric cancer are associated with higher HP infection rates.

Keywords: helicobacter pylori, rapid urease test, endoscopy, RUT

Introduction

Helicobacter pylori (HP) infection plays an important role in the pathogenesis of chronic gastritis, peptic ulcer disease, gastric malignancies¹. Hence, a vigilant approach must be undertaken to be able to determine the HP infection status of patients so that prompt and adequate treatment may be administered.

Various studies have been made to determine a relationship between symptoms and endoscopic findings to the status of HP infection. Sollano in 2015 reported that the prevalence of HP infection among

Filipinos with the following endoscopic findings were as follows: 64.4% in duodenal ulcer, 53.7% in gastric ulcer, 59.5% in gastric cancer. Additionally, the prevalence of HP infection is greater in developing countries and is influenced by socioeconomic status, ethnic background and older age^{6,9}. Diagnosis is largely performed locally via rapid urease test (RUT) and eradication tested using urea breath tests (UBT) or stool antigen test⁹.

In a local study by Destura in 2004; using culture as the gold standard, 60% of the study population was positive for HP infection (mean age of 44 years \pm 13), 70% were males. HP culture showed a

sensitivity of 45% (95% CI [29.5– 62.1]), specificity of 98% (95%CI [81.5–100%]), positive likelihood ratio of 19.93 (95% CI [1.254– 317.04]) and a negative likelihood ratio of 0.56 (95% CI [0.406– 0.772])⁶.

The objectives of this study were to determine the current prevalence of HP infection and whether the presence of HP infection by rapid urease test (RUT) is associated with specific clinical and endoscopic findings in an urban tertiary referral hospital setting.

Materials and methods

Using a retrospective design, the study was conducted in the endoscopy unit of tertiary teaching hospital in Manila, Philippines. Purposive sampling of records was done. Preliminary screening of data was achieved by review of electronic records. The records of 14,806 in and out adult patients ≥ 18 years old from January 2009 to December 2018 were reviewed. Inclusion criteria were all patients who were tested for RUT at the time of esophagogastroduodenoscopy (EGD). Baseline information such as age, gender weight, height, body mass index (BMI) and symptoms were obtained and corresponding endoscopic findings were taken by review of electronic records. Patients who underwent EGD with no determination of HP infection status by RUT were excluded.

Esophagogastroduodenoscopy (EGD)

An EGD was performed using Olympus© GIF HQ-180 and 190 with local xylocaine spray with or without sedation after an overnight fast (at least 6 hours). Endoscopic diagnosis was made at the discretion of the endoscopist. Endoscopic findings were evaluated by one attending gastroenterologist and at least 1 assisting gastroenterology fellow who were masked regarding the HP status. Disagreements were resolved by discussion.

Rapid Urease Test (RUT)

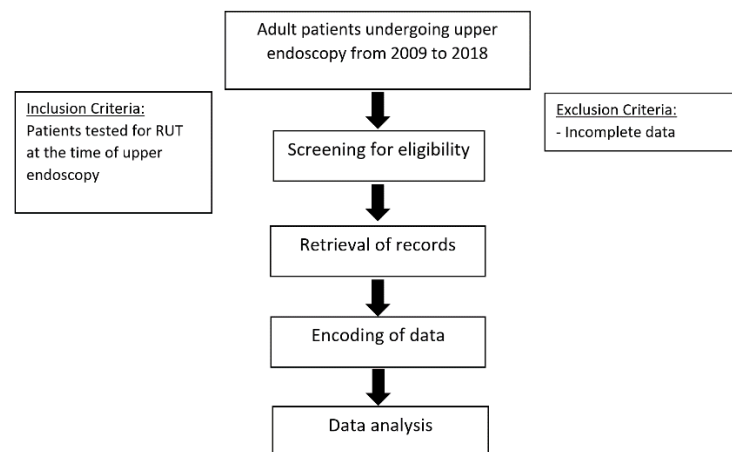
Biopsy samples ranging from 1-2 bites for rapid urease test (Lituo®), approximately 2–3 mm were taken each from the gastric antral and body mucosa and placed on the yellow colored well containing

urea and a pH indicator. The production of the urease enzyme by HP results in the decomposition of urea into bicarbonate and ammonia which causes the pH to rise and the color of the dot to change from yellow to red or pink. Positive results were read within 5 to 30 min. Samples that were weakly positive took up to 1 h to develop and no color change at 1 h was regarded negative.

Statistical Analysis

All data retrieved from chart and endoscopic report review recorded were transferred to an electronic spreadsheet (Microsoft Excel 2016) and were encoded. Data from electronic spreadsheets were imported into IBM® SPSS® Statistics version 23 for statistical analyses. Data were summarized as frequencies and proportions. With an alpha (level of confidence) of 0.05 and beta (predicted relationship or power) 0.8 with medium effect size, 372 subjects were needed in the study to meet minimum requirements.

Figure 1. Study Design



Results and Discussion

A total of 10,479 subjects were included in the study. Mean ages for patients tested for RUT were 53.08(± 16.8) years. 4,653 (44.4%) were males and 5,826 (55.6%) were females. Mean height and weight were 1.61(± 0.08) meters and 64.5(± 17.7) kilograms, respectively. Majority (20.6%) of patients had normal body mass index (BMI), while only 4.2%

and 11.3% were underweight and overweight, respectively (Table 1).

Endoscopic diagnosis of patients tested for RUT were as follows: 2,938(28.04%) patients with esophagitis, 2,261(21.58%) with peptic ulcer disease (PUD), 6,408(61.15%) with acute gastric mucosal erosions (AGME), 4,021(38.37%) as chronic atrophic gastritis (CAG), 66(0.63%) with gastric malignancy, 468(4.47%) with Portal Hypertensive Gastropathy (PHG) and 498(4.75%) with normal EGD results (Table 2). Among HP positive patients, CAG and AGME were the most frequent endoscopic findings (Figure 2).

Patients who were HP positive were compared with HP negative patients based on clinical and endoscopic findings (Table 2). 1,220(11.6%) patients were RUT positive and 9,259 (89%) were RUT negative. On univariate analysis, patients ≥ 50 years old (70.7%) and upper gastrointestinal bleeding (15.7%) had a higher rate of HP infection ($p < 0.001$). Although dyspepsia was the most common presenting symptom in patients undergoing endoscopy, it was not more frequent among patients who were HP positive. Endoscopically, PUD (38.9%) and CAG (45.3%) were associated with HP infection ($p < 0.001$).

Due to the outcomes being nominal, binary logistic regression was performed. Findings with significant p-values were analyzed. Age ≥ 50 years (OR=1.37, $p < 0.001$) was only the clinical finding associated with RUT positivity. Among endoscopic findings Peptic ulcer was noted to be 2.7 times more common to be seen in RUT positive patients. CAG (OR=1.56 $p < 0.001$) was also more commonly associated with RUT positivity. Gastric malignancies (OR=2.04, $p < 0.001$) were also noted to be seen in more RUT positive cases (Table 3).

Interestingly, AGME and Normal EGD ($p < 0.001$) seems to be protective of HP positivity; however, this result may be due to over reporting of this finding especially in RUT negative cases (Table 2). In contrast to other studies done previously, this study did not report any role of symptoms in the presence of HP positivity by RUT.

Furthermore, the prevalence of HP infection at our institution during the last 10 years (2009-2018) is decreasing at 11.6%, compared with 25.7% during the previous 10 years (1999-2008). This may be due to continued economic development in our region, which is consistent with the declining prevalence in Asia⁸.

Table 1. Demographic Profile of Patients tested for H. Pylori

Characteristic	n=10,479
Age	53.08 ± 16.8
Sex	
Male	4,653 (44.4%)
Female	5,826 (55.6%)
Height (m)	1.61 ± 0.08
Weight (kg)	64.5 ± 17.7
BMI	
Underweight (<18.5)	445 (4.2%)
Normal (18.5-22.9)	2,163 (20.6%)
Overweight (23-24.9)	1,180 (11.3%)
Obese Class I (25-29.9)	1,746 (16.7%)
Obese Class II (≥ 30)	690 (6.6%)

Figure 2. Distribution of H. Pylori Rapid Urease Test Positive patients

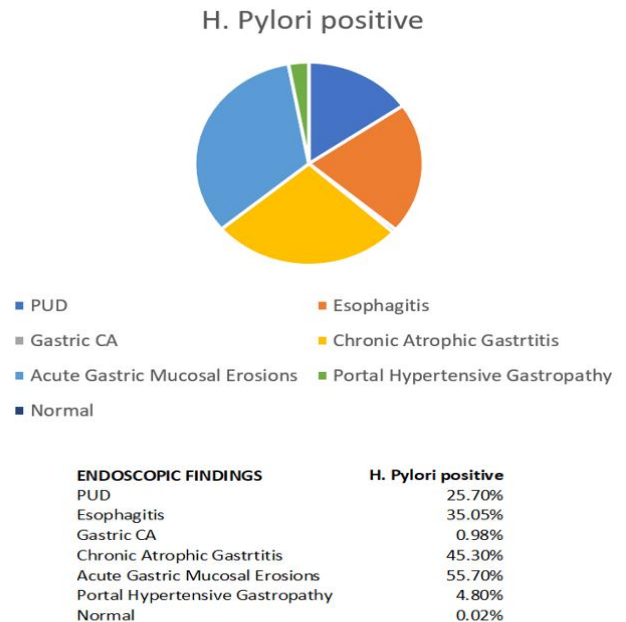


Table 2. Clinical and Endoscopic Findings according to H. Pylori Status (n=10,479)

Characteristic	H. Pylori Positive (n=1,220)	H. Pylori Negative (n=9,259)	P value
CLINICAL CHARACTERISTICS			
Age			<0.001
≥50 years	862 (13.5%)	5505 (86.5%)	
<50 years	355 (8.7%)	3727 (91.3%)	
Sex			0.043
Male	575 (12.4%)	4078 (87.6%)	
Female	645 (11.1%)	5181 (88.4%)	
Dyspepsia			0.347
Yes	719 (11.4%)	5,588 (88.6%)	
No	488 (12%)	3,574 (88%)	
Upper GI Bleeding			<0.001
Yes	191 (15.5%)	1,041 (84.5%)	
No	1,016 (11.1%)	8,121 (88.9%)	
Heartburn/Reflux			0.167
Yes	40 (9.5%)	383 (90.5%)	
No	1,144 (11.8%)	8,540 (88.2%)	
Swallowing disorders			0.990
Yes	27 (11.3%)	211 (88.7%)	
No	1,180 (11.6%)	8,951 (88.4%)	
ENDOSCOPIC FINDINGS			
PUD			<0.001
Yes	474 (21%)	1,787 (79%)	
No	746 (9.1%)	7,472 (90.9%)	
Esophagitis			0.685
Yes	348 (11.8%)	2,590 (88.2%)	
No	872 (11.6%)	6,669 (88.4%)	
Gastric CA			0.119
Yes	12 (18.2%)	54 (81.8%)	
No	1,208 (11.6%)	9,205 (88.4%)	
Chronic Atrophic Gastritis			<0.001
Yes	553 (13.8%)	3,468 (86.2%)	
No	667 (10.3%)	5,791 (89.7%)	
Acute Gastric Mucosal Erosions			<0.001
Yes	679 (10.6%)	5,729 (89.4%)	
No	541 (13.3%)	3,530 (86.7%)	
Portal Hypertensive Gastropathy			0.551
Yes	59 (12.6%)	409 (87.4%)	
No	1,161 (11.6%)	8,850 (88.4%)	
Normal			<0.001
Yes	27 (5.4%)	471 (94.6%)	
No	1,193 (12%)	8,788 (88%)	

Table 3. Binary Logistic Regression of the Predictors of H. Pylori Infection

Characteristic	P value	Exp(b)	Odds Ratio	Confidence Interval (95%)
Age ≥50 years	<0.001	0.731	1.37	0.638-0.837
PUD	<0.001	0.370	2.70	0.324-0.423
Gastric CA	0.035	0.491	2.04	0.253-0.952
Chronic Atrophic Gastritis	<0.001	0.642	1.56	0.566-0.727

Limitations

One of the limitations of our study is the utilization of RUT for determination of HP infection status as the reference standard. Histopathology is expensive and is not time efficient to be used in practice. False positive result may be determined by the use of another non-invasive screening test like stool antigen or urea breath testing. A prospective trial maybe recommended in future studies to be able to

provide randomization, standardization of endoscopic findings and utilize other mean means of diagnosis of HP infection for more accurate results. This study was also undertaken in a single tertiary center, which may not be a general representation of patients suffering from HP infection in the country, although the patients seen in the institution come from variety of ethnic groups and socioeconomic backgrounds. A multi-center study may be able to include more subjects.

Conclusion

The prevalence of HP infection using RUT at our institution during the last 10 years (2009-2018) was 11.6%. There was no specific symptom associated with HP infection. Age ≥50 years, presence of peptic ulcer, atrophic gastritis and gastric cancer are associated with higher HP infection rates.

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