ORIGINAL ARTICLE

Role of *Helicobacter pylori* in Chronic Abdominal Pain and Endoscopy-suggested Gastritis

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Abstract

Aim and background: *Helicobacter pylori* (*H. pylori*) infection can cause chronic gastritis and gastric malignancy. Upper gastrointestinal endoscopy is performed to assess the symptoms of abdominal pain but endoscopy alone is not confirmatory. Therefore, either pathological evaluation of biopsies of mucosa or detection of urease in the mucosa by rapid urease test (RUT) produces accurate diagnosis. The study aimed to assess the role of *H. pylori* infection among patients with chronic abdominal pain and endoscopy-suggested chronic gastritis and also to evaluate the association of endoscopic findings and RUT.

Materials and methods: The prospective randomized study was performed on 50 patients with clinical findings suggestive of chronic gastritis or abdominal pain of unknown etiology. Data regarding patient history and routine physical and clinical examination were recorded. Upper gastrointestinal endoscopy was performed in all patients. Organs including the esophagus, stomach, and duodenum were examined for abnormality and biopsy was performed at various sites of the affected organ. The obtained specimen from biopsy was subjected to RUT.

Results: Endoscopic finding suggested gastritis in 6% ($n = 38$) of the patients among which 31 patients were RUT positive. A significant association was found between endoscopic findings and RUT ($p = 0.013$). Patients of 31–40 years of age ($n = 11$) and males were found to be more commonly affected as indicated by a positive reaction to RUT ($n = 27$).

Conclusion: RUT facilitates rapid and accurate diagnosis of *H. pylori* infection, and along with endoscopy, can be used in the diagnosis of *H. pylori* infection in chronic gastritis.

Clinical significance: Early diagnosis of *H. pylori* is essential to formulate early and appropriate clinical strategies for better management of the patient. RUT is a well-known diagnostic test that is rapid, cheap, and simple. It detects urease in or on gastric mucosa produced by the bacteria.

Keywords: Diagnostic test, Gastric mucosa, *Helicobacter pylori*, Prospective studies, Urea, Urease.

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Introduction

Globally the prevalence of chronic gastritis and gastric ulceration is high. *Helicobacter pylori* (*H. pylori*) infection is the main cause of chronic active gastritis and has complications such as gastric adenocarcinoma and mucosa-associated lymphoid tissue lymphoma (MALT lymphoma).[1–3] The prevalence of the infection in a developed country is 10% and is as high as 80% in developing countries such as India.[4]

The associated complication with *H. pylori* infection is due to untreated chronic gastritis. Hence, identification of the etiology of gastritis is of great value in eliminating carcinoma.[5] Furthermore, the rate of mucosal damage caused by *H. pylori* is unpredictable, and infection is always transmissible. It is recommended that whenever a *H. pylori* infection is detected, it should be treated unless there is a compelling reason that would mitigate that choice.[6] The diagnosis *H. pylori* infection plays an important role in effective treatment. The tests used in diagnosis are classified as invasive and noninvasive. Invasive tests are endoscopy-based include histology, rapid urease test (RUT), culture, and polymerase chain reaction, whereas noninvasive tests including serological, urea breath test, and stool antigen test.[7] Early diagnosis of *H. pylori* is essential to formulate early and appropriate clinical strategies for better management of the patient.[5] RUT is a well-known diagnostic test that is rapid, cheap, and simple. It detects urease in or on gastric mucosa produced by the bacteria.[8] The study aimed to assess the role of *H. pylori* infection among patients with chronic abdominal pain and endoscopy suggested chronic gastritis and to evaluate the association of endoscopic findings and RUT.

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Materials and Methods

Upon obtaining institutional ethics committee approval, the prospective randomized study was carried out over a period of two years. Sample size was calculated using the formula:

$$N = \frac{z^2 \times p(1-p)}{d^2}$$

Calculated sample size was $n = 43$.

In this study $n = 50$ patients with endoscopically proved features suggestive of mucosal changes, chronic gastritis, and patients with abdominal pain with normal clinical and laboratory findings were included and informed consent was obtained.

Patients with abdominal pain due to gall stone, renal stone, chronic pancreatitis, hiatus hernia, esophagitis, and esophageal candidiasis were excluded.

Detailed patient history and data obtained from the routine clinical and physical examination were recorded in pro forma. Upper gastrointestinal endoscopy was performed using local anesthesia in the left lateral position with flexed knees and hips and hands between the legs. A plastic mouth gag was placed and held firmly by the assistant. The endoscope was passed into the oropharynx crossing the cricopharynx into the esophagus, asking the patient to swallow until the passage from the cricopharyngeal sphincter. The esophagus, stomach, first and the second part of the duodenum were viewed and screened for pathology. If the patient was detected with gastritis (mucosa inflamed and edematous associated with congestion), then biopsy was performed at various sites in the antrum of the stomach. If the patient with duodenum pain for more than 6 months and was normal to radiological examinations, then biopsy was performed on normal mucosa.

The specimen obtained from the biopsy was subjected to a RUT. Commercially prepared liquid urea broth medium was used for the test. Immediately after collection, the sample was incubated using 1.5–2 mL of urea broth at 37°C for 36 hours. Change in the color of the liquid urea broth from pale yellow to deep pink was considered a positive test.[9] Depending upon endoscopy findings, severity, and urease test, appropriate treatment was given. Patients were advised for follow-up a week after.

Statistical Analysis

Data were analyzed using R Studio V 1.2.5001 software. Categorical and continuous variables were expressed in frequency and mean ± SD, respectively. A Chi-square test was used to find the association between variables. $p < 0.05$ was considered statistically significant.

Results

The average age of the patients was 42.64 ± 14.30 years. Most of the patients of the study were male (74%). The endoscopic investigation suggested gastritis in 76% ($n = 38$) of patients among which $n = 31$ patients were positive to the RUT. In patients of normal endoscopic findings (24%, $n = 12$), the RUT was positive in $n = 5$ patients. A significant association was found between endoscopy suggested gastritis and RUT ($p = 0.013$). Patients of 31–40 years of age ($n = 11$) were most commonly affected with the *H. pylori*. The detailed distribution of RUTs according to the patient's age-group is shown in Table 1.

RUT was predominantly positive in males (75%, $n = 27$) compared to females (25%, $n = 9$). Distribution of the patients according to occupation revealed that the laborer was commonly found positive to the RUT ($n = 17$) (Table 2).

In 11 and 19 patients of positive urease test, the duration of abdominal pain was 3–6 months and 6–12 months, respectively (Table 3).

Retrosternal burning ($n = 30$), nocturnal association ($n = 17$), and periodicity ($n = 18$) were the commonly observed symptoms in patients. Whereas, loss of appetite and weight loss were observed in five and four patients, respectively.

Table 1: Distribution of RUT according to age

Age (years)	*Number of patients (n)*	*Positive RUT % (n)*
11–20	2	0
21–30	9	6 (66.67)
31–40	15	11 (73.33)
41–50	9	7 (77.78)
51–60	8	7 (87.50)
>60	7	5 (71.43)

RUT, rapid urease test

Discussion

The most common cause of gastritis is an infection of *H. pylori*. It is a microaerobic bacterium found in the gastric mucosa. The prevalence of this bacterium is affected by various factors such as geographic distribution, age, race, and socioeconomic status. Its diagnosis is categorized based on endoscopic and nonendoscopic tests.[10] The serological test for antibody shows exposure to bacteria; however, it is insufficient in the assessment of active infection.[10] RUT provides evidence regarding infection by identifying the presence of nonmammalian enzyme, i.e., urease, in, or on the gastric mucosa.[1] The study aimed to assess the role of *H. pylori* infection among patients with chronic abdominal pain and endoscopy suggested chronic gastritis and also to evaluate the association of endoscopic findings and RUT.

Upper gastrointestinal endoscopy is usually performed to assess the symptoms of upper abdominal pain.[11] However, the endoscopic diagnosis of *H. pylori* gastritis based on the gross appearance of the gastric mucosa is not recommended. Either pathological evaluation of biopsy of gastric mucosa or detection of urease in the mucosa by RUT produces accurate diagnosis of *H. pylori* infection.[5] *H. pylori* genes code for bacterial urease, which is essential for its metabolism and colonization of the gastric mucosa. The presence of this enzyme in the sample is visualized by hydrolyzing urea in a test medium to form ammonia and carbon dioxide. The color change from pale yellow to pink is considered as positive RUT.[8,12] In this study, endoscopy investigation suggested gastritis in 76% of the patients. Among these patients, 62% were positive to RUT. In the study of Mahesh et al., endoscopy gastritis was found in 81.54% of patients and RUT was positive in 83.54% of the patients.[10] Similarly, the study

Table 2: Distribution of RUT according to occupation

Occupation	*Number of patients (n)*	*Positive RUT % (n)*
Laborer	21	89.95 (17)
Housewife	11	63.64 (7)
Business/service	10	70 (7)
Student	8	62.50 (5)

RUT, rapid urease test

Table 3: Distribution of RUT according to the duration of abdominal pain

Duration of abdominal pain (months)	*Number of patients*	*Positive RUT % (n)*
<3	4	25 (1)
3–6	16	68.75 (11)
6–12	24	79.17 (19)
>12	6	83.33 (5)

RUT, rapid urease test

of Thapa et al. reported endoscopic gastritis in 76% of the patients and the study of Uotani et al. and McNicholl et al. suggested 87 and 85.9% positive cases of RUT, respectively.[8,13,14] The difference in the results may be due to the difference in the geographic distribution of the studies, variability in the studied patients. Moreover, the sensitivity and specificity of the commercial kits used in the studies can also influence the results.[5,8,10] Here, endoscopic findings were found to be significantly associated with RUT ($p = 0.013$); this suggests that endoscopic findings are a sensitive indicator of *H. pylori* infection. This is in accordance with the previous reports.[1,10] It is reported that the incidence of *H. pylori*-induced gastritis increases with the increase in the age of the cases.[10] A similar trend of infection was observed in this study, which follows the findings of the previous report.[15] However, the study performed on patients of the industrial belt of India showed a higher incidence of *H. pylori* infection in 15–30 and 46–60 year age-group.[16] The difference in the results may be due to the consumption of unhygienic fast food. Among RUT positive patients, the prevalence of infection was predominantly higher in males (75%) than females (25%) which may be due to the habit and lifestyle of the males compared to females. These findings are similar to the previous reports.[15–18]

Moayyedi et al. showed that *H. pylori* infection was more common in the lower socioeconomic strata and increased risk of infection in manual workers compared with nonmanual workers.[19] Similarly, in this study, manual laborers ($n = 17$) were most commonly infected by *H. pylori* followed by housewives ($n = 7$), business/servicemen ($n = 7$), and students ($n = 5$). This can be attributed to poor personal hygiene, lifestyle, malnutrition, and inability to afford health care.[20] In this study, most of the patients had abdominal pain for 6–12 months ($n = 19$) followed by 3–6 months ($n = 11$). Retrosternal burning ($n = 30$), nocturnal relationship ($n = 17$), and periodicity ($n = 18$) were the commonly observed symptoms in patients.

H. pylori is Gram-negative bacteria commonly found in deep part of the mucous gel covering the gastric mucosa or between the mucous layer and the gastric epithelium. In addition to chronic gastritis, *H. pylori* has a strong association with gastric adenocarcinoma and MALToma. *H. pylori* infection is most common in old age and poor socioeconomic strata, and lower levels of education can increase the risk of colonization of this organism.[21] RUT can provide a definitive diagnosis of *H. pylori* infection with the use of the endoscope and a significant association of endoscopic findings with RUT is also present. The study demonstrates that as age advances the incidence of *H. pylori* is increased. The infection was more common in the lower economic group. The limitations of the study were the small sample size, varied diet habits of the patients, and that the sensitivity and specificity of RUT were not assessed. A comparative study with other tests and a combination of two tests in the diagnosis of *H. pylori* infection with a large sample size including all variables is further recommended.

Conclusion

RUT facilitates rapid and accurate diagnosis of *H. pylori* infection. The incidence of infection was more common in males than females, and as age increased, the incidence of infection also increased. A significant association was found between RUT and endoscopy suggested gastritis. RUT and endoscopy can be used in the diagnosis of *H. pylori* infection in chronic gastritis. Further studies are warranted to confound these findings.

Ethics Committee Approval

This study has been approved by institutional ethics committee.

Clinical Significance

Early diagnosis of *H. pylori* is essential to formulate early and appropriate clinical strategies for better management of the patient. RUT is a well-known diagnostic test that is rapid, cheap, and simple. It detects urease in or on gastric mucosa produced by the bacteria.

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