



Original Article

## A Clinical Study of Patients Diagnosed with Helicobacter Pylori Infection Through Upper Gastrointestinal Endoscopy and Response to Triple Drug Regimen by Using Stool Antigen Test In Tertiary Care Teaching Hospital

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### ABSTRACT

**Introduction:** Helicobacter pylori is an important major cause of peptic ulcer disease and gastric ulcer disease like malignancies such as gastric adenocarcinoma and mucosa associated lymphoid tissue lymphoma worldwide. Dyspepsia is an extremely common symptom with prevalence in the community of approximately 30%. H. pylori treatment remains a challenge since many determinants for successful therapy are involved such as individual primary or secondary antibiotics resistance, mucosal drug concentration, patient compliance, side effect profile and cost. Accurate diagnosis of Helicobacter pylori infection in dyspeptic patients is highly essential to institute eradication therapy and to prevent complications.

**Methods and materials:** A prospective clinical study of 80 patients visiting the hospital for dyspeptic symptoms meeting the inclusion criteria were included in the study. Stool samples were collected for fecal H. pylori antigen test from patients undergoing upper gastrointestinal endoscopy for the evaluation of dyspepsia. Gastric biopsy samples were also collected for urease test and histopathology. The test performance was assessed by determining sensitivity, specificity, positive predictive value and negative predictive value with reference to histopathology examination and rapid urease test. Results 57 males and 23 females participated in the study with a mean age of 39.6 years (SD 12.10), the Highest prevalence of dyspepsia in the age group of 41-50 years, and the most common presenting complaint was epigastric pain and discomfort. Based on the reference criteria, H. pylori-infected patients were treated by a triple-drug regimen and patients were reassessed by using a rapid stool antigen test. The sensitivity, specificity, positive predictive value, and negative predictive value of the fecal H. pylori antigen test kit were 88.5%, 80.76%, 67.3%, and 94.02% respectively.

**Conclusion:** H. pylori infection is detected in a significant number of patients presenting with dyspeptic symptoms with no other specific risk factors for acid peptic disease (e.g. alcohol, smoking, usage of NSAID). The fecal H. pylori antigen test can be used as a valid alternative to invasive tests for the diagnosis of H. pylori infection. It is also relatively cheap, fast and easy to perform.

**Keywords:** H. pylori, Dyspepsia, Urease, stool antigen test..

### INTRODUCTION

Helicobacter pylori is a widespread, lifelong infection(1).The number of infected people has persisted or even increased over the past three decades due to population expansion and reinfection and recrudescence due to ineffective

eradication(2). Low socioeconomic position is linked to more crowded living situations that favour intra family transmission of *H. pylori*(3).

*Helicobacter pylori* is a spiral-shaped, microphilic, gram-negative bacteria about 3.5 microns long and 0.5 microns wide. It grows slowly on blood agar or skirrow in vitro. It colonises the stomach epithelium and produces urease, catalase, and oxidase, which are involved in chronic gastritis and peptic ulcer disease. More than half of the world's population may have them (4-6).

It is the main cause of chronic gastritis, peptic ulcer, MALToma, and stomach cancer. Peptic ulcer disease can be prevented by eliminating *H. pylori* (7). HP is 30% in developed nations and 80% in undeveloped countries (8). Socioeconomic level, housing density, overcrowding, family education, and lack of running water increase HP infection risk (9-11).

Dental plagues contain organisms (12). In addition, disinfected gastric gadgets and endoscopes have caused infection (13). Bacterial adhesion causes tissue injury and enzyme release, which damages cells directly or indirectly (14,15). *Helicobacter pylori* pathogenesis and the *cag*- pathogenicity island encoded type IV secretion system. (16).

About 25% of people have dyspepsia, a constellation of upper abdominal symptoms. Postprandial fullness, early satiety, epigastric pain, abdominal distension, nausea, vomiting, acid regurgitation, or heartburn are symptoms of dyspepsia.

The most common cause of organic dyspepsia is GERD. Peptic ulcer, gallstones, chronic pancreatitis, and esophagogastric malignancy are further reasons. The clinical and economic burden of dyspepsia evaluation and management is high. Most chronic dyspepsia patients have no clear cause despite thorough research; these cases are currently called non ulcer (or functional) dyspepsia, which may be diverse. (18)

The pathogenesis of functional dyspepsia is unclear, however sensory and motor abnormalities of the stomach and duodenum may be involved in some cases. (19)

Upper G.I. endoscopy is the preferred test for dyspepsia structural illness. Negative endoscopy minimizes anxiety and boosts enjoyment. Initial endoscopy improved symptoms, quality of life, and PPI use. Dyspepsia patients can discover cancer early with endoscopy. Alarm symptoms significantly increase GI cancer and mortality. Endoscopy detects dyspepsia's upper GI tract cancer cut-off age and other worrying signs. Thus, early detection and treatment may improve patient prognosis. Endoscopic infection is also possible. (20)

Although most infected people are asymptomatic, infection has been associated to peptic ulcer disease and non-ulcer dyspepsia. Treatment to eliminate *H. pylori* has been found to lower the risk of both illnesses. (21-23)

Although non-ulcer dyspepsia findings are inconsistent. Having *H. pylori* is also linked to gastric cancer. Gastric cancer developed over a mean follow-up of 7.8 years in 2.9% of *H. pylori*-infected patients with peptic ulcer, dyspepsia, or gastric hyperplasia in Japan, but no instances were found in uninfected patients. (24) Thus, eliminating *H. pylori* may be the best way to decrease gastric cancer 7.

*H. pylori* can be spread by feces-contaminated food and drink. Active *H. pylori* can be treated with antibiotics and bismuth compounds. Endoscopy, biopsy, histology, and culture are used to diagnose *H. pylori* infection. Urea Breath Test (UBT), serologic antibody test, and stool antigen test are also used. UBT is accurate but requires expensive lab equipment and radioactive reagent<sup>8</sup>. Serologic antibody assays detect *H. pylori*-specific IgG and cannot distinguish between active and prior infections. Stool antigen shows active *H. pylori* infection. It can also track treatment efficacy and infection recurrence without being impacted by Proton Pump Inhibitors (PPI) 9.

Specific antibodies identify *H. pylori* antigen in faeces in the Ag Rapid Test. The test can be done in 10 minutes by non-experts without lab equipment. (25)

## **MATERIALS AND METHODS**

This was a prospective study performed on patients in a tertiary care center from January 2022 to 2023 with dyspeptic symptoms in the department of general surgery, medical gastroenterology, and microbiology.

The study is estimated to include 80 patients who present with dyspeptic symptoms at the hospital over a time of two years, done by simple selective sampling.

All proven cases of *Helicobacter pylori* infection by using upper gastrointestinal endoscopy and rapid urease test in the General Surgery Department of A.J. Institute of Medical Sciences, Mangalore, will be included in the study. Patients age

group between 18-60 years, Upper abdominal pain of at least 2 weeks duration, Heartburn, or acid regurgitation, felt almost daily for at least a week, Nausea and vomiting in relation to the food or Postoperative case of symptomatic after previous gastric surgery, esophageal or duodenal surgeries were also included.

#### **Exclusion Criteria:**

1. Patient's refusal to any of investigation or treatment for the study.
2. All patients with pancreatic disorders, including obstructive jaundice and oesophageal varices.
3. Patients aged less than 18 and more than 60years.
4. Proven cases of carcinoma stomach.
5. Patients with pain abdomen confirmed by other investigations (e.g. USG) to have pathologies in other organic systems e.g. Renal/ureteric calculi.
6. Patients unfit for endoscopy e.g. congestive cardiac failure, recent myocardial infarction.

#### **Method of data collection**

All patients were surveyed for upper gastrointestinal tract problem symptoms. Patients provided detailed histories. Each patient had a thorough GPE and systemic exam and was put into proforma. Baseline tests included hemoglobin, total leucocyte count, differential leucocyte count, erythrocyte sedimentation rate, chest x-ray, and EKG for all patients. All patients who had upper GI endoscopy and tested positive for H. pylori will receive triple treatment. To assess treatment response and stool antigen test sensitivity and specificity, stool antigen test data will be recorded and tabulated.

#### **PROCEDURE**

All outpatients in this study received upper gastrointestinal endoscopy under topical anesthetic. The patients had to fast for 12 hours before the surgery. Few individuals received 5-10mg intravenous diazepam for sedation. The patient received oral or viscous lignocaine sprays 5-10 minutes before the surgery for local anesthesia. The Fujinon flexible, fiber optic endoscope was used for upper gastrointestinal endoscopy in the left-lateral position.

Direct vision advances the device with the endoscope tip in the middle lumen. Optimal insufflations to maintain esophageal lumen dilation. The oesophagus was examined for inflammation and growth. The gastro-oesophageal mucosal junction was 38-40 cm from the incisors. Ask the patient to breathe deeply to locate the esophageal gap in the diaphragm, which leaves an imprint on the esophageal and stomach walls. To confirm a hernia or columnar walled oesophagus, the hiatus and mucosal junction are recorded. Gastro-esophageal junction should be closed or broad patulous. When entering the stomach, move the endoscope slightly down and left to see greater curvature and the rear wall. Aspirating all residual liquid reduces aspiration risk and allows stomach exploration. Rotating the probe tip facilitates exploration of the stomach's anterior and posterior walls. The same position motion shows the bigger and smaller curvature down to the angulus. The J movement helps check the most proximal region of both curvatures.

Inflammation, ulcers, and growth were examined in the stomach. Rotating and angulating advance the tip endoscope to examine the antrum. Prepyloric and pyloric ring seen directly, pylorus passage seen directly. After the pylorus gives, the duodenum is assessed up to the second section. Endoscopy-diagnosed ulcero-proliferative growth, ulcers, and esophageal strictures were included for histology. Five samples were successively taken from viable cancer margin tissue for histopathology.

#### **Antigen stool test**

The on-Site H. pylori Ag Rapid Test qualitatively detects H. pylori antigen in human faeces using lateral flow chromatographic immunoassay. The non-invasive diagnostic approach can be done in 10 minutes by minimally skilled workers without laboratory equipment. This test is meant for professional screening and provides a preliminary H. pylori infection diagnosis.

A fresh stool sample and stored at -20oC for analysis without knowing the H. Pylori status.

Rapid SAT was done immediately using a commercially available kit based on ICT assay. Faeces were introduced to the extraction tube with H. pylori antigens. After vigorously mixing the sampling tube to establish a satisfactory liquid suspension, it was placed upside down vertically to sediment stool particles for one minute. Then the test strip was taken from the foil pouch and inserted vertically into the sampling tube by breaking its bottom seal. This allowed the solution to flow into the test strip's bottom. The 10-minute test result was noticed. If two red/pink bands were visible at the test and control areas within 10 minutes, the test was positive and genuine. Negative test results occur when the test area has no coloured band and the control area contains red/pink. If there was no coloured band in the control region but one in the test area, the test result was invalid.

The gold standard for H. pylori infection in this investigation was a positive fast urease test and histopathological exam.

Positive test results for one test were considered negative.

## RESULTS

This study included 80 patients with dyspepsia. There were 60 (71.2%) male patients with ages ranging from 18 years to 60 years. The mean age of the patients in this study was found to be 45.68 years. It is observed that the maximum prevalence of patients in age groups is in the age group of 20-30 years.

Endoscopic abnormalities were observed in patients. Gastric ulcers were present in 6(9.73%) patients whereas 1(1%) patients were suffering from duodenal ulcer. Pangastritis was observed in 41 patients. Other endoscopic findings were hiatus hernia, proximal gastropathy, polyp, esophagitis, telangiectasia etc.

**Table 1: various endoscopic findings**

	total Cases	Negative	Percentage	Positive	Percentage	P.value	Method
ANTRAL GASTRITIS	6	4	5.71	2		0.220047	Fisher's Exact Test for Count Data with simulated p-value (based on 1e+06 replicates)
DUODENAL ULCER	1	0	0	1	10		
ESOPHAGITIS	1	1	1.43	0	0		
GASTRIC ULCER	6	6	8.57	0	0		
PAN GASTRITIS	47	41	58.57	6	60		
PYLORIC ULCER	1	1	1.43	0	0		
PYLORO DUODNAL ULCER	1	1	1.43	0	0		
PYLORO-DUODENAL EROSION	17	16	22.86	1	10		

In this study we achieved eradication rates with lower 95% confidence interval limits exceeding 90%. Triple drug regimen was well-tolerated, 96% of patients complied with their dose regimen, and 2.3% of the patients discontinued treatment owing to adverse events.

**Table 2: Comparison between STOOL ANTIGEN TEST and FOLLOW UP IN DAYS**

	Average	Standard Deviation	Pvalue	Method
Negative	43.11	7.05	<0.05	Kruskal-Wallis rank sum test
Positive	23.8	8.35		

Among 80 patients two patients failed to return their stool specimen.

Out of all patients followed up after completing the triple drug regime it was found that negative result was seen on average of 43 days after starting triple drug regime.

Sensitivity, specificity, predictive values and accuracy of the stool antigen test kit were calculated in relation to the diagnostic criteria. The rapid stool antigen test detected H. pylori antigen in of the 80 H. pylori-infected patients (sensitivity 88.5%; 95% Confidence Interval (CI): 85.4-91.6%), and there were four false-negatives. A total of 51 patients showed negative results out of 80 H. pylori-negative patients. graph (specificity 80.76; 95% CI: 76.9-84.61%), and there were 5 false positives. The positive predictive value of the stool antigen test was 87.3 (95% CI: 62.8-71.9%) and the negative predictive value of the stool antigen test was 94.03 (95% CI: 91.7-96.3%).

Differences in test performances may depend on the characteristics of individual tests. The number of H. pylori falls in the stomach of all patients given anti-microbial therapy.

In patients who fail to have eradication, a small clone of bacteria persists and when therapy is discontinued, multiplies to re-colonize the stomach. When the density of the organism is small, the number of antigens shed in the stool may not be sufficient to result in a positive test.

According to our study, a smaller number of organisms are likely to be required for accurate measurements in faeces with the Lab after completion of therapy. Adjusting the cut-off conditions, we were able to improve the sensitivity of the test from 73.4% to 78.7% (the difference was not significant), while the sensitivity of the test increased only slightly and not significantly from 88.3% to 89.3%.

It can be seen that among the patients in whom the stool antigen test is positive; 22 patients are symptomatic. Also, in patients with stool antigen tests reported negative, 43 patients were asymptomatic at the end of the study. These two sets of patients can be grouped together in favor, therefore, of stool antigen test. Therefore, 65 patients in the whole study group showed favorable outcomes for stool antigen test.

It can also be seen that among the patients in whom the stool antigen test is positive, 7 patients are asymptomatic. Also, in patients with stool antigen tests reported negative, 8 patients were symptomatic at the end of the study. These two sets of patients can be grouped together and considered not in favor of stool antigen test. Therefore, 15 patients in the whole study group showed 'not favorable' outcomes for the stool antigen test and indicated that the test is not accurate.

Therefore, 65 patients in the study group indicate that the stool antigen test is accurate in identifying the eradication/persistence of H Pylori infection. Also, 15 patients indicate otherwise, i.e. that the stool antigen test is inaccurate for identifying the same. These two groups were therefore compared for the efficacy of stool antigen test and statistical analysis was done based on Fischer's Exact Test. A p-value of 0.023 was obtained. The significant p-value indicates, therefore that the stool antigen test can be considered for use in the follow-up study of patients at 45 days for eradication of H Pylori infection based on the symptoms of the patient after completion of triple-drug regimen.

## DISCUSSION

Out of 80 patients, 66(77.6%) patients had epigastric pain and discomfort as their chief complaint whereas food intolerance and dysphagia were present in 48(56.5%) of the patients, and nausea and vomiting in 45(52.9%) of the patients. The other complaints were heartburn in 38(44.7%), loss of weight and appetite in 36(42.4%), and indigestion in 26(30.6%) patients.

Similar study was conducted by Thomson A B R et al, in which the common presenting complaints were upper abdominal pain (34.3%), heart burn (24.5%) and acid regurgitation (13.3%),9 the observations were comparable with that of the present study.

## COMPARISON OF AGE DISTRIBUTION

The majority of patients with dyspepsia were in the age group of 41-50 years (38.5%).

The mean age in our study was 45.68 years. In the studies conducted by various authors, the mean age was as shown in Table 7

**Table 3: Comparison of age distribution**

Sl. No	Name of Study	Mean age in years
1	Thomson A B R et al.9	45.6
2	Ziauddin40	42.2+/- 15.7
3	Choomsri P et al.5	41
4	Present Study	45.68

The above studies also had similar observations in terms of mean age in patients with dyspepsia.

## COMPARISON OF GENDER DISTRIBUTION

In this study 71.25% were male patients, 28.7% were female patients. The incidence of different presentations of dyspepsia were common in males compared to females. The male/female ratio in the studies conducted by Khan et al- 2.3:1, Ziauddin- 1.6:1, Mustapha SK et al- 1.1:1 respectively. In these studies, also the majority of patients were males as observed in our study.6, 40, and 41 In a population based in Australia, female adults significantly outnumbered males in most functional gastro-intestinal disorders including functional dyspepsia.42

## COMPARISON OF VARIOUS ENDOSCOPIC FINDINGS:

In the present study, clinically significant endoscopic findings were observed in 80 patients accounting for 65.8%. GERD was by far the most common finding in 37.6% patients, while Gastritis was found in 32.9%. The next common findings were Hiatus hernia, Gastroduodenitis, Gastric ulcer, duodenal ulcer accounting for 8.2%, 7.1%, 5.9% and 5.9% respectively.

The percentage of cases with GERD and gastritis in this study was higher than that observed in studies by Sarwar et al and Ziauddin.

**TABLE 4: Comparison of common endoscopic findings in various studies**

Sl. No.	Name of the study	Gastritis	Reflux esophagitis/GERD
1	Sarwar et al.39	13%	20%
2	Ziauddin 40	18%	14%
3	Present Study	45.9%	23.6%

In children, invasive examinations such as esophagogastroduodenoscopy may be difficult to perform occasionally, and this method, which 209 involves feces evaluation, is very useful.

Moreover, it is an extremely useful examination method because it can be conducted without performing endoscopy, and such method is preferred when the patient is a child. Efforts in extracting the DNA of *H. pylori* bacteria and in testing resistance to *H. pylori* against clarithromycin using stool samples have been assessed 43,44

Although several studies have reported increased false negative results for the stool antigen test during PPI treatment, we found that stool antigen test results were more stable than UBT results in patients being treated with PPIs.

In patients who fail to have eradication, a small clone of bacteria persists and when therapy is discontinued, multiplies to re-colonize the stomach. When the density of the organism is small, the number of antigens shed in the stool may not be sufficient to result in a positive test.

According to our study, a smaller number of organisms are likely to be required for accurate measurements in faeces with the Lab after completion of therapy. Adjusting the cut-off conditions, we were able to improve the sensitivity of the test from 73.4% to 78.7% (the difference was not significant), while the sensitivity of test increased only slightly and not significantly from 88.3% to 89.3%.

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## CONCLUSION

We conclude that pan gastritis and pyloro duodenal erosions together accounted for the majority of the cases. Clinical symptomatic relief was observed in most patients and very few patients reported persistent symptoms after completion of triple drug regimen. We found no correlation between failure of treatment/ reinfection with any pre-treatment factors except reduced appetite.

This requires further evaluation as there is significant treatment failure rates noted with the current regimen. Prevalence of widespread use of acid suppressive therapy or *H. pylori* eradication, even in suspected case, may be the attributable cause for increasing treatment failure rates as observed in our study.

Re-Endoscopy used to be the standard of care in patients with recurrent symptoms or in whom drug therapy fails. But we have found stool antigen test to be a useful tool to diagnose treatment failure and screen patients for further evaluation.

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