e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(5); 1961-1965

Original Research Article

Prevalence of Helicobacter pylori Infection by Rapid Urease Test in Patients Undergoing Upper Gastrointestinal Endoscopy for Dyspepsia at a Tertiary Care Hospital in Southern Bihar: A Cross-Sectional Study

Amitesh Kumar[1], Rawi Agrawal[2]

[1]Assistant Professor, Department of Gastroenterology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India

[2]Additional Professor, Department of Hematology, Indira Gandhi institute of Medical Sciences, Patna, Bihar, India

Received: 22-03-2026 / Revised: 24-04-2026 / Accepted: 28-05-2026

Corresponding Author: Dr. Rawi Agrawal

Conflict of interest: Nil

Abstract:

Background: Helicobacter pylori (H. pylori) is associated with chronic gastritis and peptic ulcer disease and is an important risk factor for gastric malignancy. Rapid urease testing (RUT) is an endoscopy-based method used to detect urease activity in gastric biopsy specimens.

Objective: To estimate the prevalence of RUT positivity for H. pylori among adults undergoing upper gastrointestinal endoscopy for dyspepsia at a tertiary care hospital in Muzaffarpur, Bihar.

Methods: A hospital-based cross-sectional observational study was conducted at Sri Krishna Medical College and Hospital from January 2025 to January 2026. The study included 200 adults with dyspepsia undergoing upper gastrointestinal endoscopy. Antral biopsy specimens were tested using RUT. Frequencies and percentages were summarized; a 95% Wilson confidence interval was calculated for the overall proportion. Exploratory chi-square tests were calculated from the supplied symptom and endoscopic-category tables.

Results: Of 200 participants, 98 were RUT-positive, giving a positivity proportion of 49.0% (95% CI, 42.2%–55.9%). There were 108 males (54.0%) and 92 females (46.0%). The supplied endoscopic-category table showed RUT positivity in 56/94 patients with gastritis (59.6%), 23/42 with gastric/duodenal erosions (54.8%), 13/18 with duodenal ulcer (72.2%), 4/12 with gastric ulcer (33.3%), and 2/34 with normal endoscopy (5.9%). RUT positivity differed across endoscopic categories (χ^2=35.12, df=4, p<0.001). The association between presenting symptom category and RUT result was not statistically significant (χ^2=5.34, df=3, p=0.148).

Conclusion: Nearly half of the patients undergoing endoscopy for dyspepsia in this hospital-based cohort had a positive RUT. RUT positivity differed significantly across endoscopic categories but was not significantly associated with the recorded symptom category. These findings apply to the selected hospital population and should not be interpreted as community prevalence.

Keywords: Helicobacter pylori; rapid urease test; dyspepsia; upper gastrointestinal endoscopy; gastritis; cross-sectional study.

DOI: 10.25258/ijcpr.18.5.312

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Introduction

Dyspepsia is a symptom complex that commonly includes epigastric pain or burning, postprandial fullness and early satiety. Its causes include functional dyspepsia and organic gastroduodenal disorders. H. pylori infection is a major cause of chronic active gastritis and is associated with peptic ulcer disease and gastric cancer [1,2].

H. pylori is a spiral-shaped, Gram-negative organism that colonizes gastric mucosa. Its urease enzyme hydrolyses urea, producing ammonia and carbon dioxide; the resulting pH change forms the basis of the rapid urease test. RUT is convenient during endoscopy, but its performance depends on biopsy sampling, bacterial density, recent use of proton-pump inhibitors, antibiotics or bismuth, and the test protocol [3,4]. A negative RUT therefore does not invariably exclude infection, particularly when bacterial load is reduced.

The prevalence of H. pylori varies across populations and clinical settings. In a cross-sectional Indian study of 235 patients with non-ulcer dyspepsia, RUT positivity was 40.85%, illustrating the variation between hospital cohorts [5]. Current guidance emphasizes appropriate testing and treatment of confirmed infection, with eradication confirmation after therapy where applicable [6].

Local estimates can help describe the case mix among patients undergoing endoscopy.

The present study aimed to estimate RUT positivity among adults undergoing upper gastrointestinal endoscopy for dyspepsia at Sri Krishna Medical College and Hospital, Muzaffarpur, and to describe the distribution of RUT results across presenting symptoms and endoscopic findings.

Materials and Methods

Study Design and Setting: A hospital-based cross-sectional observational study conducted at Department of Gastroenterology at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India.

Study Period and Participants: The study details state January 2025 to January 2026 and a sample of 200 patients. Participants included consecutively enrolled adults undergoing diagnostic upper gastrointestinal endoscopy for persistent or recurrent dyspeptic symptoms.

Sample Size Calculation: The sample size was calculated using the single population proportion formula, considering an expected RUT positivity of 40.85% reported in an Indian study by Sharma et al. [5], a 95% confidence level, and an absolute precision of 7%.

The sample size was calculated using the single population proportion formula:

$$n = Z^2 \times p \times (1 - p) / d^2$$

Where:

- $Z = 1.96$ (95% confidence level)
- $p = 0.4085$ (expected RUT positivity)
- $d = 0.07$ (absolute precision)

Substituting the values:

$$n = (1.96)^2 \times 0.4085 \times 0.5915 / (0.07)^2$$

$$n = 189.43 \approx 190 \text{ participants}$$

Allowing for 5% incomplete or unusable observations, the final target sample size was 200 participants.

Eligibility Criteria: Inclusion criteria were age 18 years or older, persistent or recurrent dyspeptic symptoms for more than four weeks, a clinical indication for upper gastrointestinal endoscopy, and written informed consent. Exclusion criteria were recent PPI, H2-receptor antagonist or bismuth use within two weeks; antibiotic use within four weeks; previous gastric surgery or known gastric malignancy; and active upper gastrointestinal bleeding requiring emergency haemostasis.

Clinical Assessment and Endoscopy: Demographic and clinical information was recorded using a standardized proforma. Endoscopy findings were documented, and antral mucosal biopsy specimens were collected for RUT. The study describes a commercial urea-containing medium with a pH indicator, with a positive result defined by a colour change from yellow to pink/magenta.

Outcome Measures: The primary outcome was RUT positivity among the 200 enrolled patients. Secondary descriptive outcomes were RUT result by symptom category and endoscopic diagnosis.

Statistical Analysis: Categorical variables are summarized as counts and percentages. The overall RUT-positive proportion was calculated as 98/200, and its 95% confidence interval was calculated using the Wilson method. Pearson chi-square tests were calculated from the supplied aggregate cross-tabulations for symptom category and endoscopic diagnosis versus RUT result. Statistical significance was set at $p<0.05$.

Results

Participant Characteristics: A total of 200 patients were included in the supplied summary. Mean age was reported as 42.5 ± 11.2 years (range 18–72 years). The largest age group was 31–50 years (102/200, 51.0%). Table 1 presents the available demographic data.

Table 1: Demographic characteristics of the study participants.

Characteristic	n	%
Male	108	54.0
Female	92	46.0
Age 18–30 years	38	19.0
Age 31–50 years	102	51.0
Age >50 years	60	30.0
Total	200	100.0

Overall RUT positivity: RUT was positive in 98 of 200 patients (49.0%) and negative in 102 (51.0%). The estimated RUT-positive proportion was 49.0% (95% Wilson CI, 42.2%–55.9%). The distribution is shown in Table 2 and Figure 1.

Table 2: Rapid urease test results among enrolled patients.

RUT result	n	%
Positive	98	49.0
Negative	102	51.0
Total	200	100.0

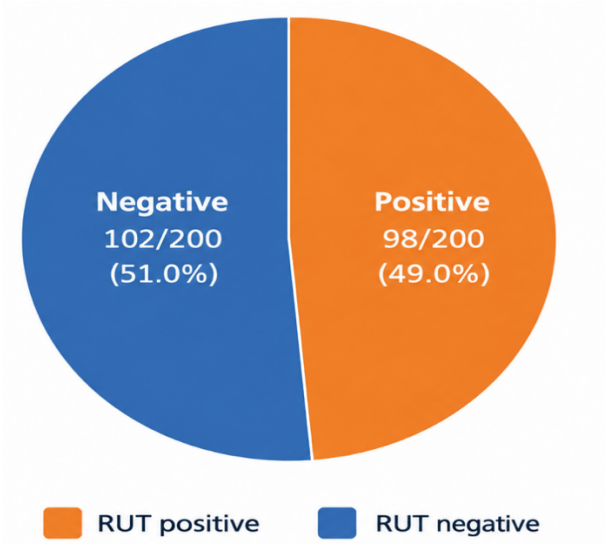


Figure 1: Overall RUT outcome: positive, 98/200 (49.0%); negative, 102/200 (51.0%).

RUT Result by Presenting Symptom: Epigastric pain/burning was the most frequent symptom category (110/200, 55.0%) and accounted for 62 of the 98 RUT-positive patients. The proportion positive within this symptom category was 56.4%. The distribution across symptom categories was not statistically significant (Pearson χ^2=5.34, df=3, p=0.148; Table 3).

Table 3: RUT results by recorded presenting symptom. Percentages are calculated within each symptom category.

Presenting symptom	Total (n)	RUT positive (n)	RUT negative (n)	Positive within category (%)
Epigastric pain/burning	110	62	48	56.4
Postprandial fullness/ bloating	52	21	31	40.4
Heartburn/regurgitation	26	10	16	38.5
Nausea/vomiting	12	5	7	41.7
Total	200	98	102	49.0

RUT result by endoscopic diagnosis: Gastritis was the most common endoscopic category (94/200, 47.0%). RUT positivity was highest among patients with duodenal ulcer (13/18, 72.2%), followed by gastritis (56/94, 59.6%) and gastric/duodenal erosions (23/42, 54.8%). Two of 34 patients with normal endoscopy were RUT-positive (5.9%). RUT positivity varied across the listed endoscopic categories (Pearson χ^2=35.12, df=4, p<0.001; Table 4). This is an unadjusted association and does not establish causation.

Table 4: RUT results according to endoscopic diagnosis. Percentages are calculated within each endoscopic category.

Endoscopic category	Total (n)	RUT positive (n)	RUT negative (n)	Positive within category (%)
Antral/diffuse gastritis	94	56	38	59.6
Gastric/duodenal erosions	42	23	19	54.8
Duodenal ulcer	18	13	5	72.2
Gastric ulcer	12	4	8	33.3
Normal endoscopy	34	2	32	5.9
Total	200	98	102	49.0

Discussion

In the present hospital-based cross-sectional study involving 200 adults undergoing upper gastrointestinal endoscopy for dyspepsia, 98 patients tested positive for Helicobacter pylori by rapid urease test (RUT), yielding a positivity proportion of 49.0% (95% CI: 42.2%–55.9%). This finding demonstrates that RUT positivity was common among patients referred for endoscopic evaluation at the study centre and highlights the clinical relevance of assessing H. pylori infection in this population.

The observed RUT positivity was comparable to findings reported in other Indian dyspepsia cohorts, although differences in study populations, geographical settings, diagnostic methods, and eligibility criteria should be considered when interpreting these estimates. A previous cross-sectional study of 235 patients with non-ulcer dyspepsia at a tertiary-care centre in India reported RUT positivity of 40.85% [5]. The higher proportion observed in the present study may reflect differences in patient characteristics and clinical presentation. However, the available data do not permit a definitive explanation for this difference.

Analysis according to endoscopic findings revealed variation in RUT positivity across diagnostic categories. The highest proportion was observed among patients with duodenal ulcer (72.2%), followed by those with gastritis (59.6%) and gastric or duodenal erosions (54.8%). In comparison, RUT positivity was observed in only 5.9% of patients with normal endoscopic findings. The association between endoscopic diagnostic category and RUT result was statistically significant ($\chi^2 = 35.12$, df = 4, $p < 0.001$). This pattern is consistent with the established relationship between H. pylori infection and peptic ulcer disease [1,2]. Nevertheless, the smaller numbers of patients in certain categories, particularly those with gastric and duodenal ulcers, warrant cautious interpretation. Furthermore, this unadjusted association does not establish a causal relationship.

Epigastric pain or burning was the most frequently recorded presenting symptom, reported by 110 patients (55.0%). Among these patients, 62 (56.4%) tested positive for RUT. However, the association between presenting symptom category and RUT result was not statistically significant ($\chi^2 = 5.34$, df = 3, $p = 0.148$). These findings suggest that the recorded symptom categories alone were insufficient to demonstrate a statistically significant relationship with RUT positivity in this study population. The results support considering appropriate diagnostic evaluation rather than relying exclusively on presenting symptoms to identify patients with H. pylori infection.

RUT remains a practical diagnostic method in endoscopic settings because it can provide a relatively rapid indication of H. pylori infection through the detection of urease activity in gastric biopsy specimens. Its diagnostic performance, however, may be influenced by bacterial density, biopsy sampling, test procedures, and recent exposure to acid-suppressive agents or antimicrobial medications [3,4]. Accordingly, RUT findings should be interpreted in the context of the clinical presentation and the circumstances under which testing was performed. Current clinical guidance emphasizes appropriate management of confirmed H. pylori infection and confirmation of eradication following treatment using a suitable test [6].

The present study provides a useful description of RUT positivity and its distribution across presenting symptoms and endoscopic findings in a tertiary-care population. However, the findings should be interpreted in light of the hospital-based study design and the use of RUT as the reported diagnostic method. As no independent reference standard was provided, the sensitivity, specificity, and overall diagnostic accuracy of RUT could not be determined. Similarly, treatment outcomes and eradication rates were not evaluated. Further studies incorporating appropriate confirmatory diagnostic methods and larger patient populations would help strengthen the evidence and clarify the broader applicability of these findings.

Conclusion

In this cohort of 200 patients with dyspepsia undergoing upper gastrointestinal endoscopy at a tertiary-care hospital in Muzaffarpur, 49.0% tested positive for Helicobacter pylori by rapid urease test (95% CI: 42.2%–55.9%). RUT positivity was significantly associated with endoscopic diagnostic category in the unadjusted analysis ($p < 0.001$), with the highest proportion observed among patients with duodenal ulcer. These findings describe the study population and highlight the clinical relevance of evaluating H. pylori in patients undergoing endoscopy for dyspepsia. The findings should be interpreted in the context of the hospital-based study population and should not be generalized to the wider community.

Declarations

Ethics Approval and Consent to Participate: The study was approved by the Institutional Ethics Committee, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India and written informed consent was obtained from all participants.

Consent for Publication: Not applicable.

Availability of Data and Materials: The data supporting the findings of this study are available

from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

Acknowledgements: The authors acknowledge Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India, for providing the institutional setting for this study.

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