

Original Research Article

HELICOBACTER PYLORI: PREVALENCE IN DYSPEPSIA AND RESPONSE TO PHARMACOTHERAPY

Dandi Suryanarayana Deo¹, V. G. Mohan Prasad², Madhura Prasad³, Vamsi Murthy. K³

¹Assistant Professor, Department of General Medicine, Dr. Moopen's Medical College, Wayanad, Kerala, India

²Professor and Head, Department Medical Gastroenterology, VGM hospital, Coimbatore, Tamil Nadu, India

³Consultant Gastroenterologist, VGM hospital, Coimbatore, Tamil Nadu, India

Received : 10/06/2026
Received in revised form : 22/07/2026
Accepted : 06/08/2026

Corresponding Author:

Dr. Dandi Suryanarayana Deo,
Assistant Professor, Department of
General Medicine, Dr. Moopen's
Medical College, Wayanad, Kerala,
India.
Email: suryadandi9@gmail.com

DOI: 10.70034/ijmedph.2026.3.364

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 2288-2294

ABSTRACT

Background: Helicobacter pylori infection is a major etiological factor implicated in functional dyspepsia. Data on its prevalence and therapeutic response from South India remain limited. The objective is to determine the prevalence of H. pylori infection in patients with functional dyspepsia and to evaluate eradication rates and symptomatic improvement following pharmacological therapy.

Materials and Methods: This prospective interventional study was conducted over 24 months (September 2022–August 2024) at a tertiary care gastroenterology centre in South India. Adult patients fulfilling Rome IV criteria for functional dyspepsia underwent upper gastrointestinal endoscopy with biopsy-based rapid urease testing for H. pylori. H. pylori-positive patients received a 14-day bismuth-based quadruple therapy. Eradication was assessed and symptom improvement was evaluated using symptom scores.

Results: A total of 839 patients with functional dyspepsia were included. The prevalence of H. pylori infection was significant among the study population. Following quadruple therapy, a high eradication rate was achieved. Statistically significant improvement in dyspeptic symptoms was observed post-eradication, particularly in postprandial fullness, epigastric pain, and early satiety.

Conclusion: H. pylori infection remains highly prevalent among patients with functional dyspepsia in South India. Eradication using bismuth-based quadruple therapy results in significant symptomatic improvement, supporting a test-and-treat strategy in high-prevalence regions.

Keywords: Helicobacter pylori, Functional dyspepsia, Prevalence, Eradication therapy, Quadruple therapy

INTRODUCTION

Helicobacter pylori (H. pylori) is a gram-negative, spiral-shaped bacterium that colonizes the gastric mucosa and is usually acquired during childhood. Infection with H. pylori has been strongly associated with a wide range of gastrointestinal^[1] diseases, including chronic gastritis, peptic ulcer disease, and gastric carcinoma. In addition to gastroduodenal pathology, H. pylori infection has also been implicated in several extra-digestive conditions such as hepatobiliary disorders, idiopathic thrombocytopenic purpura, ischemic heart disease, and autoimmune thyroid disease.^[2]

The prevalence of H. pylori infection varies markedly across geographic regions. In developed countries, prevalence ranges between 20% and 50%, whereas in

developing countries it may reach 80–90%.³ Over the past two decades, a significant decline in prevalence has been documented in Western populations. A meta-analysis by James et al. reported that after 2000, prevalence rates in Europe decreased from 48.8% to 39.8%, and in North America from 42.7% to 26.6%. Similarly, rates in the Oceania region declined from 26.6% to 18.7%. In contrast, prevalence rates in Asia (53.6% vs. 54.3%) and Latin America (62.8% vs. 60.2%) remained largely unchanged before and after 2000.^[4]

H. pylori is a spiral-shaped, urease-positive, microaerophilic Gram-negative organism uniquely adapted to survive in the acidic gastric environment. Infection is frequently implicated in dyspepsia, and several studies have demonstrated symptomatic improvement following eradication therapy.^[5] The

pathophysiology involves altered gastric acid secretion, persistent mucosal inflammation, delayed gastric emptying, and abnormal antral gastrin secretion. Among available diagnostic modalities, the rapid urease test using endoscopic gastric mucosal biopsies remains a simple, rapid, and cost-effective method for detecting infection.

In patients with dyspepsia—particularly those over 60 years of age or with alarm features—the diagnostic yield of upper gastrointestinal endoscopy with biopsies increases significantly. Common endoscopic findings in dyspeptic patients include peptic ulcer disease, duodenitis, gastritis, and erosive esophagitis.^[6]

Crowded living conditions and poor socioeconomic status contribute to higher infection rates, with transmission occurring via direct human contact or ingestion of contaminated food and water. Iatrogenic transmission during endoscopic and dental procedures has also been reported.^[7] Approximately half of patients with dyspepsia are infected with *H. pylori*, with infection being two to three times more common than in healthy controls.^[8]

The 2015 Kyoto Global Consensus Report recommends eradication therapy for all *H. pylori*-positive individuals worldwide. The report defines *H. pylori*-associated dyspepsia as sustained symptomatic relief lasting 6–12 months following eradication, reflecting the time required for resolution of gastritis.^[9] Although several randomized controlled trials have evaluated eradication therapy in functional dyspepsia, results remain inconsistent.^[10] Data from India—particularly South India—on prevalence, eradication success, and symptom response remain limited, prompting the need for the present study.

MATERIALS AND METHODS

Study Design and Setting: In the Department of Medical Gastroenterology at VGM Hospital & Institute of Gastroenterology, Coimbatore, Tamil Nadu, India, this prospective interventional study was carried out over a 24-month period, from September 2022 to August 2024. The purpose of the study was to determine the prevalence of *Helicobacter pylori* infection in patients with functional dyspepsia, as well as the eradication rates and clinical results of pharmacological treatment.

Study Population: Adults with dyspepsia symptoms who presented to the gastroenterology outpatient department between the ages of 18 and 70 were screened. The Rome IV criteria, which call for the presence of unpleasant postprandial fullness, early satiety, epigastric discomfort, or epigastric burning in the absence of structural disease on endoscopic assessment, were used to diagnose functional dyspepsia.

Inclusion Criteria

- Age between 18 and 70 years

- Presence of dyspeptic symptoms fulfilling Rome IV criteria for functional dyspepsia
- Willingness to provide informed consent

Exclusion Criteria

- Presence of peptic ulcer disease, gastrointestinal malignancy, or other organic causes of dyspepsia on endoscopy
- Significant comorbid illnesses involving cardiac, hepatic, renal, pulmonary, haematological, or endocrine systems
- Pregnancy or lactation
- Prior history of drug allergy or idiosyncratic reaction to study medications
- Use of proton pump inhibitors within one week prior to endoscopy

Refusal to participate or anticipated poor compliance
A total of 906 patients were initially recruited. Twenty-seven patients were excluded due to ulcers or masses detected on endoscopy, eight due to significant comorbid conditions, and 32 were lost to follow-up. The final analysis included 839 patients.

Sample Size Calculation: The primary goal of determining the prevalence of *H. pylori* in patients with functional dyspepsia was the basis for calculating the sample size. The necessary sample size was around 783 assuming a prevalence of 50%, which offers maximal variability and guarantees a conservative estimate with a 95% confidence level ($Z = 1.96$) and a margin of error of 3.5%. 839 participants were included in order to account for any dropouts and exclusions and provide sufficient statistical power.

Previous research showing prevalence rates above 50% in comparable populations from India and other areas confirmed this idea.

Endoscopic Evaluation and Diagnosis

After a minimum eight-hour overnight fast, all enrolled patients underwent esophagogastroduodenoscopy (EGD). An electronic database was used to record endoscopic findings. Two samples from the antrum (lesser and greater curvature), two from the corpus (lesser and greater curvature), and one from the incisura angularis were taken during gastric biopsies in accordance with the Sydney protocol.

Rapid urease testing (RUT) was performed on biopsy specimens using a urea-rich medium with phenol red as a pH indicator. *H. pylori* was detected when the color changed from yellow to pink in less than 30 minutes. Patients were classed as *H. pylori*-infected if their RUT was positive.

Treatment Protocol: All *H. pylori*-positive patients received a 14-day bismuth-based quadruple therapy consisting of:

- Tetracycline 500 mg four times daily
- Metronidazole 250 mg four times daily
- Dexlansoprazole 60 mg once daily
- Colloidal bismuth subcitrate 240 mg twice daily

This regimen is supported by consensus recommendations and prior studies demonstrating

high efficacy and acceptable safety profiles in first-line and rescue therapy.

Assessment of Eradication: The Helic Ammonia Breath Test was employed to evaluate the eradication of *H. pylori* eight weeks after the completion of therapy. Before the test, patients abstained from antisecretory medications and fasted for at least eight hours. Before and after consuming unlabeled ¹²C urea, two breath samples were collected. The indicator tube turns blue instead of yellow when *H. pylori* is present because urease-mediated hydrolysis raises the amount of ammonia in exhaled breath. The HELIC ABT Reader was utilized to automatically interpret the results.

Symptom Assessment: Dyspeptic symptoms were evaluated using the Gastrointestinal Symptom Rating Scale (GSRS) at baseline, two months, and six months after therapy. Symptoms were graded on a four-point scale:

- 0 – None
- 1 – Mild
- 2 – Moderate
- 3 – Severe

Cumulative symptom scores were calculated. Symptom improvement was expressed as:

$$\text{Improvement (\%)} = \frac{\text{Score before treatment} - \text{Score after treatment}}{\text{Score before treatment}} \times 100$$

Responses were categorized as:

- 75%: Complete response
- 50–75%: Significant relief
- 25–50%: Moderate relief
- <25%: Mild relief

Therapeutic efficiency was defined as the combined proportion of patients achieving complete response and significant relief.

Statistical Analysis: SPSS version 27.0 (IBM Corp., Armonk, NY) and Epi Info (CDC, Atlanta, GA) were used to analyze the data. The mean ± standard deviation or median with interquartile range were used to express continuous variables, depending on the situation. Frequencies and percentages were used to sum up categorical variables.

The prevalence of *H. pylori*, the main outcome, was calculated using 95% confidence intervals. Fisher's exact test or chi-square were used to examine correlations between categorical variables. When comparing continuous variables between two groups, the Mann-Whitney U test or the unpaired t-test were used. ANOVA with repeated measurements was employed to evaluate how symptom scores changed over time. A two-tailed p-value of less than 0.05 was deemed statistically significant.

RESULTS

Demographic Characteristics of the Study Population:

A total of 839 patients with dyspepsia were included in the study. The gender distribution showed a slight male predominance, with 462 males (55.1%) and 377 females (44.9%) [Table 1, Figure 1] The age distribution of the study participants is presented in [Table 1 and Figure 1] The 31–45 years age group constituted the largest proportion of patients, accounting for 38.6% (n = 324) of the total population. This was followed by the 46–60 years age group, comprising 29.4% (n = 247). Patients aged 18–30 years represented 14.5% (n = 121), while those aged 61–75 years accounted for 17.5% (n = 147).

Table 1: Demographic Characteristics of the Study Population (N = 839)

Variable	Category	Number	Percentage (%)
Gender	Male	462	55.1
	Female	377	44.9
Age group (years)	18–30	121	14.5
	31–45	324	38.6
	46–60	247	29.4
	61–75	147	17.5

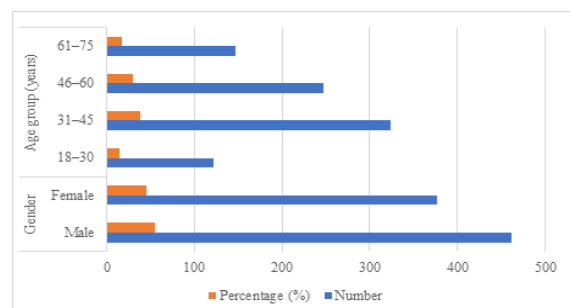


Figure 1: Demographic Characteristics of the Study Population (N = 839)

Clinical Presentation and Symptom Profile of Dyspepsia:

The clinical presentation and symptom

profile of dyspepsia among the study population are summarized in [Table 2] Epigastric Pain Syndrome (EPS) was the most common clinical pattern, observed in 354 patients (42.2%), followed by Postprandial Distress Syndrome (PDS) in 284 patients (33.8%). Overlapping features of EPS and PDS were identified in 201 patients (24.0%).

Analysis of individual dyspeptic symptoms showed that epigastric pain was the most frequently reported symptom, present in 253 patients (30.1%), followed by epigastric burning sensation in 227 patients (27.1%). Postprandial fullness was reported by 189 patients (22.5%), while early satiety was observed in 170 patients (20.3%).

Table 2: Clinical Presentation and Individual Symptom Distribution of Dyspepsia (N = 839)

Category	Clinical pattern / Symptom	No. of cases	Percentage (%)
Clinical presentation	Epigastric Pain Syndrome	354	42.2
	Postprandial Distress Syndrome	284	33.8
	Overlap	201	24.0
Individual symptoms	Epigastric pain	253	30.1
	Epigastric burning	227	27.1
	Postprandial fullness	189	22.5
	Early satiety	170	20.3

Prevalence of Helicobacter pylori Infection: The prevalence of Helicobacter pylori infection among the study patients is depicted in [Table 3 and Figure 2] A total of 438 patients (52.2%) tested

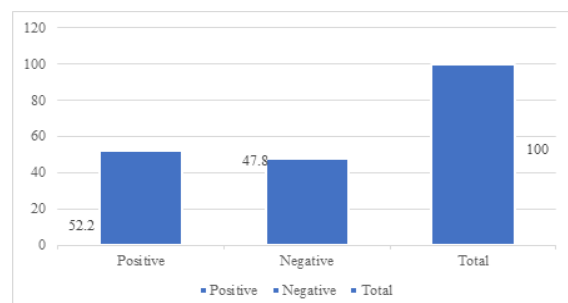
positive for H. pylori, while 401 patients (47.8%) were negative, indicating a high prevalence of infection in the study population.

Table 3: Prevalence of H. pylori Among Study Patients

H. pylori Status	No. of Patients	Percentage (%)
Positive	438	52.2
Negative	401	47.8
Total	839	100

Table 4: H. pylori Prevalence in Relation to Gender

Gender	N	Positive	Negative	Positive %
Male	462	249	213	53.8
Female	377	189	188	50.1

**Figure 2: Prevalence of H. pylori Among Study Patients**

H. pylori Prevalence in Relation to Gender: The relationship between H. pylori infection and gender

is shown in [Table 4] Among male patients, 249 out of 462 (53.8%) tested positive for H. pylori. Among female patients, 189 out of 377 (50.1%) were positive. The prevalence was slightly higher among males compared to females.

H. pylori Prevalence in Relation to Age: Age-wise distribution of H. pylori infection is presented in [Table 5] The highest prevalence was observed in the 31–45 years age group, with 196 out of 324 patients (60.5%) testing positive. The 46–60 years age group showed a prevalence of 53.0% (131/247). Lower prevalence rates were observed in the 61–75 years age group (45.5%) and the 18–30 years age group (36.3%).

Table 5: H. pylori Prevalence in Relation to Age

Age group	Positive	Negative	Total	Positive %
18–30	44	77	121	36.3
31–45	196	128	324	60.5
46–60	131	116	247	53.0
61–75	67	80	147	45.5

H. pylori Eradication Rate: All patients who tested positive for H. pylori received quadruple therapy. Eight weeks after completion of therapy, eradication was assessed using the Helic ammonia breath test. As shown in [Table 6 and Figure 3], 385 patients (88.9%) tested negative, indicating successful eradication, while 53 patients (11.1%) remained positive.

Endoscopic Findings in H. pylori-Positive Patients: Endoscopic findings among H. pylori-positive patients are summarized in [Table 7] The most common finding was pangastritis, involving the fundus, corpus, and antrum, characterized by mucosal erythema and erosions, seen in 315 patients (72%). Antral gastritis was observed in 96 patients (22%). Mucosal nodularity was noted in 35 patients

(8%), hyperplastic polyps in 30 patients (7%), and duodenitis in 21 patients (5%).

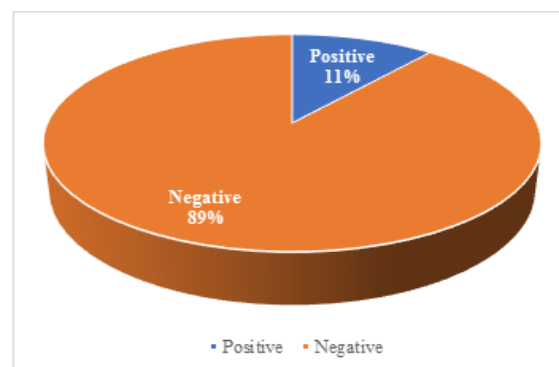
**Figure 3: H. pylori Eradication Rate**

Table 6: H. pylori Eradication Rate

Helic Ammonia Breath Test	No. of patients	Percentage (%)
Positive	53	11.1
Negative	385	88.9

Table 7: Endoscopic Findings in H. pylori–Positive Patients

Area involved	Endoscopic diagnosis	No. of cases	Percentage (%)
Fundus, corpus & antrum	Pangastritis	315	72
Antrum	Antral gastritis	96	22
Stomach	Mucosal nodularity	35	8
Stomach	Hyperplastic polyps	30	7
Duodenum	Duodenitis	21	5

Patients may have had more than one endoscopic finding; therefore, percentages are not mutually exclusive.

Effect of H. pylori Eradication on Dyspeptic Symptoms: The effect of H. pylori eradication on symptom severity was assessed using the Gastrointestinal Symptom Rating Scale at baseline, 2

months, and 6 months post-treatment [Table 8] The mean symptom score at baseline was 10.84 ± 2.01 , which significantly decreased to 5.28 ± 2.22 at 2 months and further to 4.69 ± 2.23 at 6 months. Statistical analysis revealed a highly significant improvement in symptoms ($F = 1568.994$; $p < 0.00001$).

Table 8: Effect of H. pylori Eradication on Symptoms of Dyspepsia

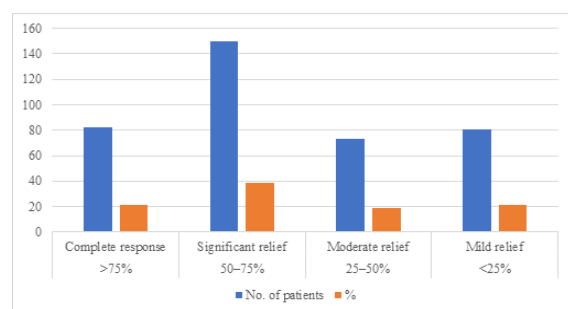
Time point	Mean	SD
Baseline	10.84	2.01
2 months	5.28	2.22
6 months	4.69	2.23

Improvement in Symptom Score After Eradication Therapy: Symptom improvement was categorized based on percentage reduction in symptom score [Table 9 and Figure 4] Complete response ($>75\%$ improvement) was observed in 82 patients (21.1%), while significant relief (50–75%)

was seen in 150 patients (39.0%). Moderate relief (25–50%) was noted in 73 patients (18.9%), and mild relief ($<25\%$) in 81 patients (21.0%). The overall therapeutic efficiency, defined as the sum of complete response and significant relief, was 61.1%.

Table 9: Improvement in Symptom Score

Improvement	Response	No. of Patients	Percentage (%)
$>75\%$	Complete response	82	21.1
50–75%	Significant relief	150	39.0
25–50%	Moderate relief	73	18.9
$<25\%$	Mild relief	81	21.0

**Figure 4: Improvement in Symptom Score**

DISCUSSION

Functional dyspepsia is a multifactorial disorder characterized by altered gut–brain axis interactions, visceral hypersensitivity, impaired gastric accommodation, and delayed gastric emptying. Helicobacter pylori infection has been implicated as an important contributor to symptom generation through chronic gastric inflammation and alterations in gastric acid secretion via changes in gastrin and somatostatin release.^[11]

In the present study, the majority of patients belonged to the 31–45-year age group (38.6%), with a slight male predominance (55.1%). These findings are consistent with previous epidemiological studies reporting that functional dyspepsia commonly affects individuals in early and middle adulthood.^[12] Variations in age and gender distribution across studies may be influenced by differences in healthcare-seeking behavior, socioeconomic factors, and regional demographic characteristics.^[13]

The prevalence of H. pylori infection in our cohort was 52.2%, indicating that more than half of patients with functional dyspepsia were infected with the organism. This finding is comparable to reports from several developing countries, including India, where H. pylori infection remains highly prevalent.^[14] The observed prevalence is higher than that reported in most developed countries, reflecting the continued influence of socioeconomic conditions, sanitation, overcrowding, and environmental factors on transmission patterns.^[15]

Age-wise analysis demonstrated that the highest prevalence of H. pylori infection was observed in the

31–45-year age group (60.5%), followed by the 46–60-year age group (53.0%). The prevalence was relatively lower among younger adults aged 18–30 years (36.3%) and older individuals aged 61–75 years (45.5%). These findings suggest variation in infection prevalence across age groups within the study population.^[16] Gender-based differences were minimal, with prevalence rates of 53.8% among males and 50.1% among females, consistent with previous reports demonstrating no clear association between gender and *H. pylori* infection.^[17]

A high eradication rate of 88.9% was achieved using the bismuth-based quadruple therapy regimen. This eradication rate is comparable to those reported in contemporary studies evaluating quadruple therapy and supports current recommendations favoring combination regimens in regions where antimicrobial resistance may reduce the effectiveness of conventional triple therapy.^[18] The favorable eradication outcome observed in the present study demonstrates the effectiveness of this regimen in routine clinical practice.

Endoscopic evaluation among *H. pylori*-positive patients revealed pangastritis as the predominant finding, observed in 72% of cases, followed by antral gastritis (22%). These findings support the well-established association between *H. pylori* infection and chronic inflammatory changes involving the gastric mucosa.^[11]

Symptomatic improvement following eradication therapy was substantial. Mean symptom scores decreased significantly from 10.84 ± 2.01 at baseline to 5.28 ± 2.22 at two months and further to 4.69 ± 2.23 at six months after treatment ($p < 0.00001$). Furthermore, the overall therapeutic efficiency, defined as the proportion of patients achieving complete response or significant relief, was 61.1%. These findings indicate that eradication therapy provides meaningful and sustained clinical benefit in a substantial proportion of patients with functional dyspepsia. Although previous studies have reported variable outcomes regarding symptom improvement after eradication, accumulating evidence suggests that successful eradication can lead to sustained symptom relief in selected patients.^[19]

The gradual reduction in symptom scores observed over the follow-up period may reflect progressive resolution of gastric inflammation following successful treatment. The results of the present study support the concept of *H. pylori*-associated dyspepsia as a clinically relevant and potentially reversible condition.^[19]

Overall, the findings of this study support a test-and-treat strategy for *H. pylori* infection among patients with functional dyspepsia in high-prevalence settings. In addition to achieving high eradication rates, treatment was associated with significant symptomatic improvement, highlighting the clinical value of identifying and treating *H. pylori* infection in affected individuals.^[20]

CONCLUSION

Helicobacter pylori infection was identified in a substantial proportion of patients with functional dyspepsia in South India. Bismuth-based quadruple therapy demonstrated high eradication rates and was associated with significant and sustained improvement in dyspeptic symptoms following successful eradication. These findings support the role of routine testing and appropriate eradication therapy for *H. pylori* in patients with functional dyspepsia, in accordance with current international consensus guidelines. In addition to symptomatic relief, eradication may provide long-term benefits by reducing the risk of *H. pylori*-related gastroduodenal diseases and improving overall patient outcomes.

REFERENCES

1. Wotherspoon AC, Ortiz-Hidalgo C, Falzon MR, Isaacson PG: *Helicobacter pylori*-associated gastritis and primary B-cell gastric lymphoma. *Lancet*. 1991; 338:1175-6.
2. Parsonnet J: *Helicobacter pylori* and gastric cancer. *Gastroenterol Clin North Am*. 1993; 22:89-104.
3. Suerbaum S, Michetti P: *Helicobacter pylori* infection. *N Engl J Med*. 2002; 347:1175-86.
4. Hooi JKY, Lai WY, Ng WK, et al.: Global prevalence of *Helicobacter pylori* infection: systematic review and meta-analysis. *Gastroenterology*. 2017; 153:420-9.
5. Suzuki H, Moayyedi P: *Helicobacter pylori* infection in functional dyspepsia. *Nat. Rev. Gastroenterol. Hepatol*. 2013; 10(3): 168–174.
6. Faintuch JJ, Silva FM, Navarro-Rodriguez T, et al.: Endoscopic findings in uninvestigated dyspepsia. *BMC Gastroenterol*. 2014 Feb 6; 14: 19.
7. Brown LM: *Helicobacter pylori*: epidemiology and routes of transmission. *Epidemiol Rev*. 2000; 22:283-97.
8. Armstrong, D. *Helicobacter pylori* infection and dyspepsia. *Scand J Gastroenterol. Suppl*. 1996; 215, 38–47.
9. Sugano K, Tack J, Kuipers EJ, et al. Kyoto global consensus report on *Helicobacter pylori* gastritis. *Gut*. 2015;64(9):1353–67.
10. Zhao, B.; Zhao, J.; Cheng, W.F.; Shi, W.J.; Liu, W.; Pan, X.L.; Zhang, G.X. Efficacy of *Helicobacter pylori* eradication therapy on functional dyspepsia: A meta-analysis of randomized controlled studies with 12-month follow-up. *J. Clin. Gastroenterol*. 2014, 48, 241–247.
11. Talley NJ, Ford AC. Functional dyspepsia. *N Engl J Med*. 2015;373(19):1853–1863.
12. Ford AC, Mahadeva S, Carbone MF, Lacy BE, Talley NJ. Functional dyspepsia. *Lancet*. 2020;396(10263):1689–1702.
13. Mahadeva S, Goh KL. Epidemiology of functional dyspepsia: a global perspective. *World J Gastroenterol*. 2006;12(17):2661–2666.
14. Hunt RH, Xiao SD, Megraud F, Leon-Barua R, Bazzoli F, van der Merwe S, et al. *Helicobacter pylori* in developing countries. World Gastroenterology Organisation Global Guideline. 2011.
15. Brown LM. *Helicobacter pylori*: epidemiology and routes of transmission. *Epidemiol Rev*. 2000;22(2):283–297.
16. Megraud F, Brassens-Rabbé MP, Denis F, Belbourni A, Hoa DQ. Seroepidemiology of *Helicobacter pylori* infection in various populations. *J Clin Microbiol*. 1989;27(8):1870–1873.
17. Feldman RA, Eccersley AJ, Hardie JM. Epidemiology of *Helicobacter pylori*: acquisition, transmission, population prevalence. *Gut*. 1997;41(1):2–6.
18. Malfertheiner P, Megraud F, O'Morain CA, Gisbert JP, Kuipers EJ, Axon AT, et al. Management of *Helicobacter pylori* infection—the Maastricht V/Florence Consensus Report. *Gut*. 2017;66(1):6–30.

19. Moayyedi P, Soo S, Deeks J, Forman D, Mason J, Innes M, et al. Eradication of *Helicobacter pylori* for non-ulcer dyspepsia. Cochrane Database Syst Rev. 2006;(2):CD002096.
20. Sugano K, Tack J, Kuipers EJ, Graham DY, El-Omar EM, Miura S, et al. Kyoto global consensus report on *Helicobacter pylori* gastritis. Gut. 2015;64(9):1353–1367.