Section: General Surgery

Original Research Article

EVALUATION OF HELICOBACTER PYLORI INFECTION IN INDIVIDUALS PRESENTING WITH SYMPTOMATIC CHOLELITHIASIS

Mohammed Naufel K[1], Pandy[2]

[1]*Postgraduate, Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu, India*
[2]*Professor, Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu, India*

Received *: 06/06/2026*
Received in revised form *: 20/07/2026*
Accepted *: 03/08/2026*

Corresponding Author:
Dr. Mohammed Naufel K,
Postgraduate, Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu, India
Email: kmnoufel@gmail.com

DOI: 10.70034/ijmedph.2026.3.373

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

Int J Med Pub Health
2026; 16 (3); 2343-2347

ABSTRACT

Background: Gallstone disease is one of the most common gastrointestinal disorders worldwide, often associated with chronic inflammation of the gallbladder mucosa. Recent studies have suggested a possible link between H. pylori infection and the formation or symptom manifestation of gallstones. H. pylori, traditionally known for its role in peptic ulcer disease and gastritis, has been detected in the biliary system, implicating it as a potential contributor to gallbladder inflammation and lithogenesis. The aim is to determine the prevalence of H. pylori infection in patients with symptomatic gallstone disease and to assess its correlation with clinical and biochemical parameters.

Materials and Methods: This prospective observational study was conducted in the Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam, over a period of one year. A total of 70 patients diagnosed with symptomatic gallstone disease by ultrasonography were included. Patients with prior cholecystectomy, recent antibiotic use, or known peptic ulcer disease were excluded. During laparoscopic or open cholecystectomy, gallbladder mucosal samples were collected for H. pylori detection using the rapid urease test and histopathological examination. Relevant clinical data, including age, sex, duration of symptoms, and liver function tests, were recorded and statistically analyzed.

Results: Among the 70 patients studied, H. pylori infection was detected in 28 patients (40%). The prevalence was higher among females (67.8%) compared to males (32.2%). A significant association was observed between H. pylori positivity and chronic cholecystitis on histopathology ($p < 0.05$). Patients with H. pylori infection also showed a higher incidence of elevated liver enzymes and longer symptom duration. However, no significant correlation was found between H. pylori positivity and the number or size of gallstones.

Conclusion: The findings suggest a potential association between Helicobacter pylori infection and symptomatic gallstone disease, indicating that H. pylori may contribute to the chronic inflammatory process of the gallbladder and play a role in gallstone formation.

Keywords: Biliary infection, Cholelithiasis, cholecystitis, Helicobacter pylori, Mucosa.

INTRODUCTION

Cholelithiasis, or gallstone disease, constitutes a considerable global health issue, impacting 10–20% of the adult population globally and significantly contributing to gastrointestinal morbidity.[1] Gallstone development occurs due to the supersaturation of bile constituents—cholesterol, bilirubin, and bile salts.[2]

The disease spectrum extends from asymptomatic gallstones to symptomatic cholelithiasis, marked by biliary colic, dyspepsia, and consequences including cholecystitis and pancreatitis. Established risk factors encompass obesity, female sex, increasing age, dyslipidemia, and dietary practices; however, new data indicates that infectious organisms, notably Helicobacter pylori (H. pylori), may contribute to the pathogenesis of biliary disorders.[3,4]

Helicobacter pylori is a gram-negative, spiral-shaped bacterium recognized chiefly for its association with chronic gastritis, peptic ulcer disease, and gastric cancer. Recent research has expanded its clinical scope beyond the gastric mucosa, linking it to many extragastric illnesses, including hepatobiliary diseases.[5]

The identification of H. pylori DNA and H. pylori-like entities in bile, gallbladder tissue, and gallstones suggests a potential role in gallstone formation and chronic cholecystitis.[6] The suggested mechanisms encompass bacterial colonization of the biliary epithelium, persistent inflammation resulting in mucosal damage, and changes in bile composition that may facilitate the nucleation and precipitation of cholesterol crystals.[7]

Moreover, H. pylori has been associated with metabolic anomalies, including insulin resistance and dyslipidemia, both recognized as risk factors for gallstone development. The urease activity of the bacteria, its synthesis of cytotoxins, and its capacity to cause oxidative stress may facilitate alterations in the local biliary environment that promote gallstone formation.[8]

Notwithstanding these links, the evidence remains ambiguous, since several studies indicate a strong correlation between H. pylori infection and cholelithiasis, but others do not show a direct connection. Discrepancies may be attributed to variations in geographic prevalence, diagnostic methodologies, and sample kinds (gastric versus biliary).[9]

Assessing H. pylori infection in persons with symptomatic cholelithiasis may yield significant insights into its possible etiopathogenic involvement. Should a positive correlation be found, it may transform the comprehension of gallstone disease pathogenesis and provide new opportunities for preventive and treatment strategies. Utilizing non-invasive screening methods for H. pylori, such as serology, urea breath tests, or stool antigen assays, in conjunction with invasive detection techniques like polymerase chain reaction (PCR) or histopathology from bile and gallbladder tissue, might improve diagnostic precision.[10, 11]

This study is to assess the prevalence of H. pylori infection in persons with symptomatic cholelithiasis and to investigate its potential correlation with gallstone disease. The study aims to connect gastrointestinal microbiology with hepatobiliary pathophysiology through this investigation. Determining a causal or contributing involvement of H. pylori in cholelithiasis could have substantial clinical ramifications, including the possible application of eradication therapy as a supplementary measure in the treatment or prevention of gallstone disease.

AIMS AND OBJECTIVES:

- To determine the prevalence of H. pylori infection in patients with symptomatic gallstone disease.
- To assess its correlation with clinical and biochemical parameters.

MATERIALS AND METHODS

This was a prospective observational study conducted in the Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam, over a period of one year. A total of 70 patients who were diagnosed with symptomatic gallstone disease by ultrasonography and scheduled for cholecystectomy were enrolled in the study.

The diagnosis of cholelithiasis was confirmed by the presence of echogenic calculi with posterior acoustic shadowing on ultrasound examination, along with characteristic clinical features such as right upper quadrant pain, dyspepsia, nausea, or fatty food intolerance. Informed written consent was obtained from all participants after explaining the nature, purpose, and potential benefits of the study. Patient confidentiality was strictly maintained throughout the study.

Inclusion Criteria

- Adult patients (≥18 years) diagnosed with symptomatic cholelithiasis.
- Patients undergoing elective laparoscopic or open cholecystectomy.
- Patients who provided written informed consent to participate in the study.

Exclusion Criteria

- Patients with a history of prior cholecystectomy.
- Patients who had received antibiotics, proton pump inhibitors, or bismuth compounds within four weeks prior to surgery (as these may suppress H. pylori).
- Patients with known or previously treated H. pylori-associated peptic ulcer disease or gastritis.
- Patients with gallbladder malignancy, acute cholecystitis, or other hepatobiliary pathologies.

Demographic details such as age and sex, duration of symptoms, and clinical presentation were recorded using a prestructured proforma. Biochemical investigations including liver function tests (LFTs) — total bilirubin, alkaline phosphatase (ALP), aspartate transaminase (AST), and alanine transaminase (ALT) — were performed to evaluate hepatic involvement.

During laparoscopic or open cholecystectomy, gallbladder specimens were collected under sterile conditions. After removal, each gallbladder was opened aseptically, and samples were obtained from the mucosal surface of the gallbladder wall, particularly from areas showing inflammation or thickening. A portion of the mucosal tissue was immediately subjected to the rapid urease test (RUT), while another portion was fixed in 10% buffered formalin and sent for histopathological examination (HPE).

1. **Rapid Urease Test (RUT):** The mucosal biopsy specimen was placed in urea broth containing phenol red indicator. The development of a pink

or red color within 30 minutes to 2 hours was considered positive, indicating the presence of H. pylori urease activity.

2. **Histopathological Examination:** Formalin-fixed, paraffin-embedded tissue sections were stained using Hematoxylin and Eosin (H&E) for routine examination and Giemsa stain for specific identification of H. pylori organisms. Microscopic evaluation focused on inflammatory changes in the mucosa, epithelial alterations, and the presence of spiral-shaped bacilli consistent with H. pylori.

All collected data were compiled and analyzed using appropriate statistical software (SPSS version 25.0). Descriptive statistics including mean, standard deviation, and percentage were used to summarize continuous and categorical variables. The chi-square test or Fisher's exact test was employed to assess associations between categorical variables, such as H. pylori positivity and patient characteristics. A p-value of <0.05 was considered statistically significant.

RESULTS

Out of 70 patients, 47 (67.1%) were females and 23 (32.9%) were males, showing a female preponderance with a male-to-female ratio of approximately 1:2. The age of patients ranged from 25 to 65 years, with a mean age of 44.2 ± 10.8 years. The highest incidence of cholelithiasis was noted in the 41–50 years age group. Middle-aged females were most commonly affected, consistent with the known higher prevalence of gallstone disease in women. [Table 1]

Table 1: Distribution of Patients According to Age and Sex

Age Group (Years)	Male (n=23)	Female (n=47)	Total (n=70)	Percentage (%)
21–30	3	6	9	12.9
31–40	5	14	19	27.1
41–50	8	18	26	37.1
51–60	5	7	12	17.1
>60	2	2	4	5.8
Total	23	47	70	100

Among the 70 patients, H. pylori infection was detected in 28 patients (40%) by either the rapid urease test or histopathology. Out of the 28 H. pylori-positive cases, 19 were females (67.8%) and 9 were males (32.2%). Although females showed a higher prevalence of H. pylori positivity, the difference between genders was not statistically significant ($p > 0.05$). The predominance among females may reflect the higher baseline incidence of gallstone disease in women. [Table 2]

Table 2: Association Between gender and H. pylori Positivity

Gender	H. pylori Positive (n=28)	H. pylori Negative (n=42)	Total (n=70)	Percentage of Positivity (%)
Male	9	14	23	39.1
Female	19	28	47	40.4

Histopathological examination revealed that 52 (74.3%) patients had features of chronic cholecystitis, while 18 (25.7%) had mild or acute inflammation. Among the 28 H. pylori-positive cases, 24 showed histological evidence of chronic cholecystitis. A statistically significant association ($p < 0.05$) was observed between H. pylori positivity and chronic cholecystitis, suggesting that chronic mucosal inflammation may favor bacterial colonization or persistence. [Table 3]

Table 3: Correlation Between H. pylori positivity and histopathology

Histopathological Diagnosis	H. pylori Positive (n=28)	H. pylori Negative (n=42)	Total (n=70)	p-value
Chronic Cholecystitis	24	28	52	<0.05*
Acute/Mild Inflammation	4	14	18	

Patients with H. pylori infection had a higher incidence of elevated liver enzymes (AST, ALT, ALP) and a longer duration of symptoms compared to H. pylori-negative patients. [Table 4]

Table 4: Association of H. pylori with Clinical and Biochemical Parameters

Parameter	H. pylori Positive (n=28)	H. pylori Negative (n=42)	p-value
Elevated Liver Enzymes	18 (64.3%)	14 (33.3%)	<0.05*
Mean Duration of Symptoms (months)	8.6 ± 2.4	5.3 ± 1.9	<0.05*

The number and size of gallstones were compared between H. pylori-positive and negative groups. There was no significant correlation between H. pylori positivity and the number or size of gallstones. [Table 5]

Table 5: Correlation Between Gallstone Characteristics and H. pylori Positivity

Gallstone Parameter	H. pylori Positive (n=28)	H. pylori Negative (n=42)	p-value
Single Stone	11 (39.3%)	18 (42.8%)	>0.05
Multiple Stones	17 (60.7%)	24 (57.2%)	
Large Stones (>1 cm)	13 (46.4%)	18 (42.8%)	>0.05

DISCUSSION

This prospective observational study aimed to evaluate Helicobacter pylori infection in persons with symptomatic cholelithiasis and to determine its correlation with clinicopathological characteristics. Through fast urease testing and histological analysis, H. pylori was found in 28 cases (40%) out of the 70 individuals that were examined. This study indicates a significant incidence of H. pylori infection in individuals with gallstone disease, reinforcing the concept that H. pylori may contribute to the development of biliary illnesses.

The overall detection percentage in this investigation (40%) corresponds with the findings of Ali N et al.[12] and Memon AI et al.[13] who detected H. pylori DNA in 30–50% of gallbladder tissues and bile samples from cholelithiasis patients. The organism's urease and phospholipase activities may result in bile supersaturation, cholesterol crystal precipitation, and chronic mucosal inflammation, hence facilitating gallstone formation and persistence.

The current study revealed a notable correlation between H. pylori positive and chronic cholecystitis ($p < 0.05$). In H. pylori-positive cases, 85.7% demonstrated histological indications of chronic cholecystitis.

This was analogous to the study conducted by Loosen SH et al.[14] observed that 8.0% of patients with H. pylori infection were diagnosed with cholelithiasis, compared to 5.8% of those without the infection ($P < 0.001$). Chronic cholecystitis can foster bacterial colonization due to compromised bile flow and modified mucosal defences, so establishing a reciprocal link between infection and inflammation.

The study revealed a greater prevalence of H. pylori infection in females (67.8%) than in males (32.2%). Despite the lack of statistical significance, this difference reflects the recognized epidemiological trend of gallstone disease, characterized by a female predominance attributable to hormonal effects on bile composition, including estrogen-induced cholesterol supersaturation.

The noted female predominance in H. pylori positivity may be attributable to the elevated baseline risk of cholelithiasis in women. In contrast to the current study, Loosen SH et al.[14] observed that males were more frequently impacted than females.

Patients with H. pylori infection demonstrated prolonged symptom duration and elevated liver enzyme values in comparison to H. pylori-negative patients. This may indicate the persistent inflammatory condition caused by bacterial colonization and potential subclinical liver involvement due to ascending infection or cytokine-mediated hepatocellular damage.[15] The current study did not reveal any significant association between H. pylori positive and the quantity or size of gallstones.

The formation of gallstones is complex, encompassing genetic, metabolic, and nutritional factors, with H. pylori potentially serving as a cofactor rather than a primary cause. In contrast to the current investigation, Mir ZI et al.[16] observed statistically significant differences in ultrasonography between the two groups with the prevalence of numerous stones (81.8%) and constricted gallbladder (72.7%) in H. pylori positive individuals.

The study conducted by Bidel Niko R et al.[17] revealed no significant correlation between the clinical manifestations of cholelithiasis and the presence of Helicobacter pylori in the gallbladder mucosa. No significant correlation was seen between the presence of this bacterium in the gallbladder mucosa and the age or sex of the patients ($p<0.05$). Variations in diagnostic methods, sample types, and geographic disparities in H. pylori prevalence may explain these inconsistencies.

The possible processes connecting H. pylori to gallbladder illness encompass direct mucosal colonization, the production of inflammatory cytokines, the development of oxidative stress, and the alteration of bile acids. Molecular mimicry between bacterial and host antigens may also contribute to persistent inflammation. Numerous investigations have proven the bacterium's presence in bile and the gallbladder wall by polymerase chain reaction and immunohistochemistry, substantiating its survival and pathogenic potential inside the biliary system.

Nevertheless, the current study adds to the increasing amount of data that shows a connection between chronic inflammatory gallbladder disease and H. pylori infection. The results substantiate the notion that H. pylori infection may aggravate gallbladder inflammation and affect disease chronicity, however its direct causal relationship with gallstone development necessitates further study.

Limitations: The study was limited by its single-center design and modest sample size. Detection of H. pylori was restricted to histopathology and rapid urease testing; molecular techniques such as PCR could have enhanced diagnostic sensitivity. Moreover, bile samples were not analyzed separately, which might have provided additional microbiological evidence of infection.

CONCLUSION

This study reveals a large incidence of H. pylori infection in individuals with symptomatic cholelithiasis, highlighting a strong correlation between H. pylori positive and chronic cholecystitis. The infection was associated with extended symptom duration and increased liver enzymes, indicating a potential role in biliary inflammation. Nonetheless, no correlation was detected between gallstone size or quantity. Additional extensive molecular investigations are necessary to elucidate the pathogen's involvement in the pathophysiology of gallbladder disease.

REFERENCES

1. Wang X, Yu W, Jiang G, Li H, Li S, Xie L et al. Global epidemiology of gallstones in the 21st century: a systematic review and meta-analysis. Clinical Gastroenterology and Hepatology. 2024 Aug 1;22(8):1586-95.
2. Fujita N, Yasuda I, Endo I, Isayama H, Iwashita T, Ueki T et al. Evidence-based clinical practice guidelines for cholelithiasis 2021. Journal of gastroenterology. 2023 Sep;58(9):801-33.
3. Ali A, AlHussaini KI. Helicobacter pylori: a contemporary perspective on pathogenesis, diagnosis and treatment strategies. Microorganisms. 2024 Jan 22;12(1):222.
4. Sun H, Warren J, Yip J, Ji Y, Hao S, Han W et al. Factors influencing gallstone formation: a review of the literature. Biomolecules. 2022 Apr 6;12(4):550.
5. Elbehiry A, Marzouk E, Aldubaib M, Abalkhail A, Anagreyyah S, Anajirih N et al. Helicobacter pylori infection: current status and future prospects on diagnostic, therapeutic and control challenges. Antibiotics. 2023 Jan 17;12(2):191.
6. Myung SJ, Kim MH, Shim KN, Kim YS, Kim EO, Kim HJ et al. Detection of Helicobacter pylori DNA in human biliary tree and its association with hepatolithiasis. Digestive diseases and sciences. 2000 Jul;45(7):1405-12.
7. Monstein HJ, Jonsson Y, Zdolsek J, Svanvik J. Identification of Helicobacter pylori DNA in human cholesterol gallstones. Scandinavian journal of Gastroenterology. 2002 Jan 1;37(1):112-9.
8. Svistunov AA, Osadchuk MA, Mironova ED, Vasil'Eva IN. Helicobacter pylori as a risk factor for the development of metabolic syndrome and gallstone disease. Медицинский вестник Северного Кавказа. 2021;16(2):135-9.
9. Lim KP, Lee AJ, Jiang X, Teng TZ, Shelat VG. The link between Helicobacter pylori infection and gallbladder and biliary tract diseases: A review. Annals of hepato-biliary-pancreatic surgery. 2023 Aug 31;27(3):241-50.
10. Sousa C, Ferreira R, Santos SB, Azevedo NF, Melo LD. Advances on diagnosis of Helicobacter pylori infections. Critical Reviews in Microbiology. 2023 Nov 2;49(6):671-92.
11. Talebi Bezmin Abadi A. Diagnosis of Helicobacter pylori using invasive and noninvasive approaches. Journal of pathogens. 2018;2018(1):9064952.
12. Ali N, Qureshi A, Hassan SA, Fareed R, Salahuddin F, Panjwani NF. Frequency of helicobacter pylori infection in patients presenting with symptomatic cholilithiasis at tertiary care hospital, Karachi. Pakistan Journal of Surgery. 2022 Apr 1;38(2).
13. Memon AI, Naz S, Memon RA, Bhatti AM, Ali M. Prevalence of Helicobacter Pylori Gastritis among Patients with Symptomatic Cholelithiasis. Journal Of Pharmaceutical Research International. 2022 Apr 20;34(33A):1-5.
14. Loosen SH, Killer A, Luedde T, Roderburg C, Kostev K. Helicobacter pylori infection associated with an increased incidence of cholelithiasis: A retrospective real-world cohort study of 50 832 patients. Journal of Gastroenterology and Hepatology. 2024 Sep;39(9):1809-15.
15. Dora D, Bokhari SM, Aloss K, Takacs P, Desnoix JZ, Szklenárik G et al. Implication of the gut microbiome and microbial-derived metabolites in immune-related adverse events: emergence of novel biomarkers for cancer immunotherapy. International journal of molecular sciences. 2023 Feb 1;24(3):2769.
16. Mir ZI, Gupta S, Sharma R. Outcome of H. Pylori Infection of Gallbladder Mucosa in Patients of Chronic Cholecystitis. JK Science: Journal of Medical Education & Research. 2021 Oct 10;23(4):200-4.
17. Bidel Niko R, Pakzad S, Mahmoudlou R, Mahmoudzadeh L. Evaluation of the relationship between the prevalence of helicobacter pylori in the gallbladder mucosa and clinical symptoms in patients with symptomatic cholelithiasis. Studies in Medical Sciences. 2022 Nov 10;33(8):603-9.