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Incidence And Risk Factors Of H Pylori Infection In Cases Of Emergency Surgery Done For Gastroduodenal Perforation

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ABSTRACT

Introduction: *Peptic ulcer disease (PUD) remains a major global health issue, with perforation representing one of its most serious complications. Helicobacter pylori infection is a key etiological factor in ulcerogenesis; however, its precise role in gastroduodenal perforation remains uncertain. This study aimed to evaluate the prevalence of H. pylori infection in patients with perforated peptic ulcers and to analyze associated clinical outcomes.*

Materials and Methods: *A prospective cross-sectional study was conducted at Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, Karnataka, from July 2023 to December 2024. A total of 48 patients aged 18–70 years undergoing emergency laparotomy for perforated peptic ulcer were enrolled. Clinical, demographic, and perioperative data were collected. Intraoperative biopsy specimens were examined histopathologically for H. pylori. Data were analyzed using SPSS version 26, with Chi-square test applied to assess associations; $p < 0.05$ was considered significant.*

Results: *Among 48 patients, 87.5% were male and the majority (31.3%) were aged 41–50 years. Vomiting (85.4%), severe abdominal pain (35.4%), and fever (60.4%) were common presenting features. Radiological evidence of gas under the diaphragm was observed in 95.8% of cases. Histopathology confirmed H. pylori positivity in 66.7% of patients. No statistically significant associations were found between infection status and prior anti-ulcer therapy, eradication treatment, analgesic use, or endoscopy history ($p > 0.05$).*

Conclusion: *H. pylori infection was highly prevalent among patients with perforated peptic ulcers, highlighting its importance in disease pathogenesis. Lack of association with prior therapy suggests reinfection, incomplete eradication, or resistance. Routine screening, eradication protocols, and public health measures are essential to reduce disease burden.*

Keywords: *Helicobacter pylori, Peptic ulcer perforation, Clinical outcomes*

INTRODUCTION

Peptic ulcer disease (PUD) remains a significant global health concern, affecting millions worldwide and contributing substantially to morbidity and mortality [1]. Among its complications, perforation is one of the most serious, often presenting as an acute surgical emergency with high rates of morbidity if not promptly managed [2]. Although several risk factors such as smoking, alcohol use, and non-steroidal anti-inflammatory drug (NSAID) consumption have been implicated in ulcerogenesis, the discovery of Helicobacter pylori revolutionized the understanding of the pathogenesis of both gastric and duodenal ulcers [3]. The organism is now recognized as a major etiological factor, being associated with more than 90% of duodenal ulcers and nearly 80% of gastric ulcers [4].

H. pylori is a microaerophilic, spiral-shaped bacterium that colonizes the gastric mucosa, leading to chronic gastritis and mucosal injury [5]. Since its discovery by Warren and Marshall, for which they received the Nobel Prize in 2005, extensive evidence has demonstrated its central role in ulcer formation and recurrence [6]. Despite this, the precise relationship between H. pylori infection and ulcer perforation remains unclear. While eradication therapies have significantly reduced recurrence rates of uncomplicated ulcers, perforated ulcers continue to pose a challenge in surgical practice, especially in resource-limited settings where the prevalence of H. pylori remains high [7].

Globally, H. pylori infection affects nearly half of the population, with higher prevalence in developing countries [8]. Transmission is believed to be predominantly feco-oral or oro-oral, though the exact mechanisms are yet to be established. Despite wide availability of eradication therapy, the burden of perforated peptic ulcer disease remains substantial, particularly in younger and middle-aged populations [9]. Perforation not only increases the risk of sepsis and peritonitis but also contributes significantly to postoperative morbidity and mortality. Understanding the association between H. pylori and gastroduodenal perforation is therefore crucial for guiding prevention, early diagnosis, and management strategies [10,11].

The present study was undertaken to identify risk factors associated with H. pylori-induced perforated peptic ulcer and to evaluate the clinical outcomes of affected patients. Particular emphasis was placed on requirements for mechanical ventilation, intensive care and hospital stay, as well as morbidity and mortality, in order to provide a clearer perspective on the impact of H. pylori infection in patients with gastroduodenal perforation.

MATERIALS AND METHODS

This prospective cross-sectional study was conducted in the Department of General Surgery, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, B.G. Nagara, Mandya District, Karnataka. The study was carried out over a period of 18 months, from July 2023 to December 2024. A minimum sample size of 48 patients was calculated using the formula z^2pq/d^2, with prevalence (p) of 14%, allowable error (d) of 14%, and z-value of 1.96, thereby ensuring adequate power for the analysis.

All patients admitted with gastro-duodenal ulcer perforation and undergoing emergency laparotomy were considered for inclusion. Eligible participants were aged between 18 and 70 years and willing to provide written informed consent. Patients with chronic respiratory or cardiac disease, immunocompromised states, pregnancy, malignancy, end-organ failure, a prior history of H. pylori eradication therapy, associated abdominal trauma, or those unwilling to provide consent were excluded from the study.

Detailed clinical data were collected using a pre-tested proforma. Information recorded included demographic particulars, presenting complaints with duration, detailed history of illness, and relevant clinical examination findings. Baseline investigations such as complete blood counts, renal and liver function tests, chest radiograph, erect abdominal X-ray, and abdominal CT scan (where indicated) were performed. Patients were initially stabilized with resuscitative measures, after which all underwent emergency laparotomy for perforation repair. Biopsy specimens obtained during surgery were subjected to histopathological examination to detect H. pylori infection.

Data were entered into Microsoft Excel and analyzed using SPSS version 26 (IBM Corp., Armonk, NY). Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized using means and standard deviations. Associations between categorical variables were assessed using the Chi-square test, with a p-value of <0.05 considered statistically significant.

RESULTS

The study included 48 patients, with the majority being male (87.5%) and only 12.5% female. The age distribution revealed that the largest group was between 41–50 years (31.3%), followed by those aged above 50 years (27.1%) and 31–40 years (22.9%). Patients younger than 20 years were least represented (4.2%) (Table 1).

Table 1: Demographic characteristics of study population (N = 48)

Variable	Category	Frequency	Percentage (%)
Age Group (years)	< 20	2	4.2 %
	21–30	7	14.6 %
	31–40	11	22.9 %
	41–50	15	31.3 %
	> 50	13	27.1 %
Gender	Male	42	87.5 %
	Female	6	12.5 %

Abdominal pain was one of the most frequent complaints, reported as moderate in 45.8% and severe in 35.4% of cases, while 18.8% experienced mild discomfort. Fever was present in 60.4% of patients, and vomiting was noted in 85.4%, making it the most common symptom. Hematemesis occurred in a smaller proportion (12.5%), highlighting variation in clinical presentation (Table 2).

Table 2: Clinical Symptoms in Study Population

Symptom	Category	Frequency	Percentage (%)
Abdominal pain	**Mild**	9	18.8 %
	Moderate	22	45.8 %
	Severe	17	35.4 %
Fever	**Present**	29	60.4 %
	Absent	19	39.6 %
Vomiting	**Present**	41	85.4 %
	Absent	7	14.6 %
Hematemesis	**Present**	6	12.5 %
	Absent	42	87.5 %

A considerable number of patients had no prior medical interventions. Only 18.8% had a history of anti-H. pylori therapy and a similar proportion had received anti-ulcer treatment. Endoscopic evaluation was performed in 14.6%, while the majority (85.4%) had not undergone this diagnostic procedure (Table 3).

Table 3. Past History of Treatment and Diagnostic Interventions

Variable	Category	Frequency	Percentage (%)
Anti-H. pylori treatment	**Yes**	9	18.8 %
	No	39	81.3 %
Anti-ulcer treatment	**Yes**	9	18.8 %
	No	39	81.3 %
Esophagogastric Endoscopy performed	**Yes**	7	14.6 %
	No	41	85.4 %

Clinical evaluation revealed anemia in 33.3% of patients and tachycardia in 81.3%. Blood pressure was distributed almost equally between category A (35.4%) and category B (35.4%), while category C accounted for 29.2%. Regarding temperature, nearly half the patients (45.8%) recorded category 1 values, followed by 29.2% with category 0 and 25% with category 2 (Table 4).

Table 4: Clinical Evaluation Findings

Parameter	Category	Frequency	Percentage (%)
Anemia	**Present**	16	33.3 %
	Absent	32	66.7 %
Tachycardia	**Present**	39	81.3 %
	Absent	9	18.7 %
Blood pressure	**Category A**	17	35.4 %
	Category B	17	35.4 %
	Category C	14	29.2 %
Temperature	**0**	14	29.2 %
	1	22	45.8 %
	2	12	25.0 %

Per abdominal examination identified abdominal distension in 66.7% of patients and epigastric guarding in 87.5%. Gas under the diaphragm was a striking finding, present in 95.8% of cases. Total counts were increased in 79.2% of patients, while 12.5% had moderate values and 8.3% had low counts (Table 5).

Table 5: Per Abdomen Findings

Finding	Category	Frequency	Percentage (%)

Abdominal distension	**Present**	32	66.7 %
	Absent	16	33.3 %
Epigastric guarding	**Present**	42	87.5 %
	Absent	6	12.5 %
Gas under diaphragm	**Present**	46	95.8 %
	Absent	2	4.2 %
Total counts	**Increased**	38	79.2 %
	Low	4	8.3 %
	Moderate	6	12.5 %

Histopathological confirmation demonstrated H. pylori positivity in 66.7% of the cohort, with the remaining 33.3% testing negative. This highlights a significant burden of infection within the study population (Figure 1).

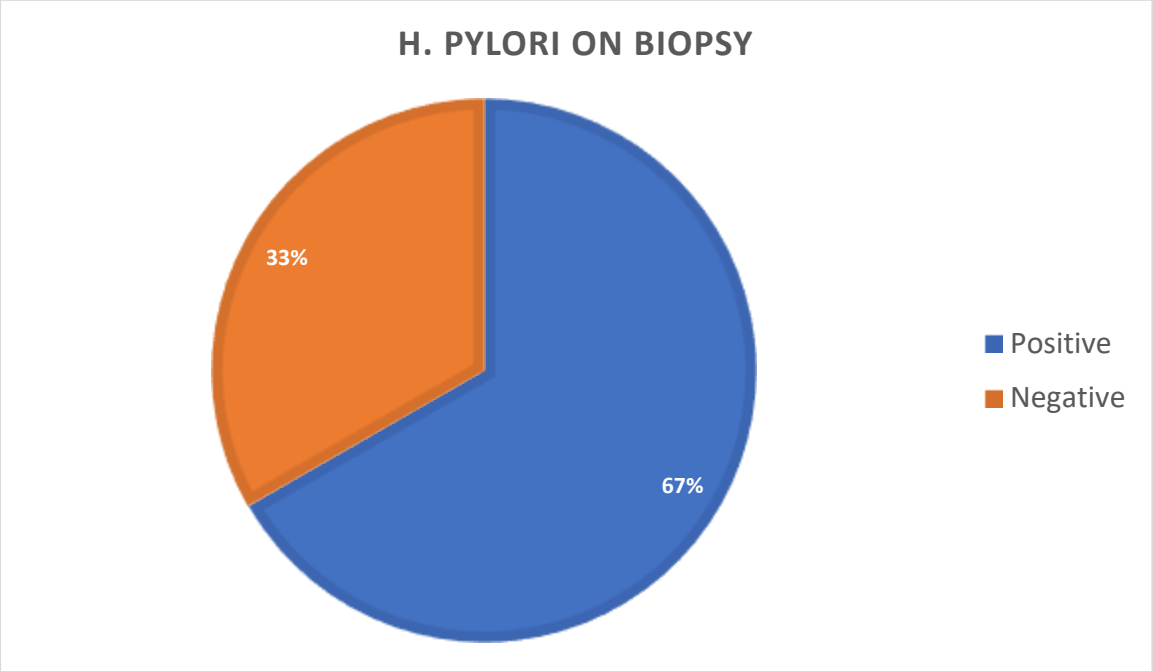

Figure 1: Pie chart showing H. pylori on biopsy

Statistical analysis did not identify any significant associations between H. pylori positivity and patient history. Gender, previous anti-H. pylori therapy, prior anti-ulcer treatment, analgesic intake, or history of endoscopy were not correlated with infection status, with all p-values being >0.05 (Table 6).

Table 6: Association Between Patient History and H. pylori Positivity

Variable	Category	H. pylori Negative	H. pylori Positive	Total	p-value
Gender	**Male**	13	29	42	0.643
	Female	3	3	6	
Anti-H. pylori treatment	**Yes**	2	7	9	0.695
	No	14	25	39	
Anti-ulcer treatment	**Yes**	7	11	18	0.752
	No	9	21	30	
Analgesic intake	**Yes**	4	12	16	0.588
	No	12	20	32	
Esophagogastric Endoscopy performed	**Yes**	3	4	7	0.885
	No	13	28	41	

DISCUSSION

The present study reports a notable prevalence of H. pylori infection (66.7%) among patients presenting with perforated gastro-duodenal ulcers. This finding aligns well with the estimated average prevalence of 65–70% reported in other studies of perforated peptic ulcers [12,13]. Conversely, other research has reported lower rates—around 47%—suggesting that variation may be due to differing diagnostic modalities, patient cohorts, or regional factors [14,15]. Taken together, these data highlight H. pylori as a frequent—and likely pivotal—contributor to ulcer perforation, even if not universally present.

Clinically, the strong predominance of symptoms such as vomiting (85%), abdominal pain, and fever (60%) underscores the inflammatory and systemic burden of perforation in H. pylori–associated disease. These clinical manifestations corroborate the known pathophysiology: H. pylori colonization induces chronic gastritis and mucosal erosion, which predispose to ulcer formation and eventual perforation. Although hematemesis was less common (12.5%), this matches findings that bleeding is often the dominant complication in non-penetrating ulcers, while perforation represents a different clinical trajectory [16]. The constellation of symptoms in perforated cases reaffirms the aggressive nature of the complication and the importance of considering H. pylori even when classic bleeding features are absent.

Interestingly, our study found no significant associations between H. pylori positivity and prior anti-ulcer or eradication therapy, analgesic use, or previous endoscopy. This pattern raises concerns about treatment efficacy, reinfection, or compliance—all plausible in regions with endemic infection and limited follow-up. Similar observations suggest that once treated, H. pylori eradication reduces ulcer recurrence significantly, yet persistence or reinfection may undermine long-term outcomes [2,17]. The lack of correlation with past treatment might also reflect suboptimal adherence to protocols or emerging resistance patterns, underscoring the need for improved treatment strategies and patient monitoring.

Finally, the demographic skew in our population—87.5% male—mirrors findings across multiple studies showing higher ulcer perforation rates in males, though gender alone often does not determine infection status [18,19]. The absence of statistically significant gender differences in infection in our dataset likely reflects both sample limitation and the endemic nature of H. pylori in the region. Clinically, our observations support the need for routine H. pylori screening and eradication protocols in all patients undergoing perforation repair, regardless of previous treatment history. This aligns with broader literature advocating for combined surgical and eradication therapy to reduce recurrence and improve patient prognosis [2,12].

CONCLUSION

This study demonstrates that Helicobacter pylori infection remains highly prevalent in patients with gastro-duodenal ulcer perforation, with significant clinical and systemic implications. The high positivity rate (66.67%), near-universal presence of ulcers, and frequent manifestations such as vomiting, epigastric pain, anemia, and tachycardia underscore the bacterium's role as both a localized and systemic pathogen. The absence of significant associations with prior medical history highlights challenges of reinfection, suboptimal eradication, or treatment noncompliance, suggesting that H. pylori may be endemic in the studied population. These findings reinforce the need for early diagnosis, adherence to evidence-based eradication protocols, and routine follow-up to confirm treatment success. From a broader perspective, integrating clinical vigilance with public health initiatives—such as patient education, improved sanitation, and community-based eradication strategies—will be critical to reducing the burden of H. pylori–related disease in this setting.

REFERENCES

1. Xie X, Ren K, Zhou Z, et al. The global, regional and national burden of peptic ulcer disease from 1990 to 2019: a population-based study. *BMC Gastroenterol.* 2022;22(1):58.
2. Chung KT, Shelat VG. Perforated peptic ulcer - an update. *World J Gastrointest Surg.* 2017;9(1):1-12.
3. Cekin AH, Taskoparan M, Duman A, et al. The role of Helicobacter pylori and NSAIDs in the pathogenesis of uncomplicated duodenal ulcer. *Gastroenterol Res Pract.* 2012;2012:189373.
4. Kate V, Ananthakrishnan N, Tovey FI. Is Helicobacter pylori infection the primary cause of duodenal ulceration or a secondary factor? A review of the evidence. *Gastroenterol Res Pract.* 2013;2013:425840.
5. Reyes VE. Helicobacter pylori and its role in gastric cancer. *Microorganisms.* 2023;11(5):1312.
6. Marshall B. Helicobacter pylori--a Nobel pursuit? *Can J Gastroenterol.* 2008;22(11):895-6.

7. Aljuhani SA, Sherwani AA, Alnamshah FO, et al. Impact of Helicobacter pylori eradication on surgical treatment of peptic ulcer disease: systematic review. *Cureus*. 2024;16(6):e63523.
8. Salih BA. Helicobacter pylori infection in developing countries: the burden for how long? *Saudi J Gastroenterol*. 2009;15(3):201-7.
9. Xie X, Ren K, Zhou Z, et al. The global, regional and national burden of peptic ulcer disease from 1990 to 2019: a population-based study. *BMC Gastroenterol*. 2022;22(1):58.
10. Weledji EP. An overview of gastroduodenal perforation. *Front Surg*. 2020;7:573901.
11. Wong CS, Chia CF, Lee HC, et al. Eradication of Helicobacter pylori for prevention of ulcer recurrence after simple closure of perforated peptic ulcer: a meta-analysis of randomized controlled trials. *J Surg Res*. 2013;182(2):219-26.
12. Gisbert JP, Pajares JM. Helicobacter pylori infection and perforated peptic ulcer prevalence of the infection and role of antimicrobial treatment. *Helicobacter*. 2003;8(3):159-67.
13. Amalia R, Vidyani A, I'tishom R, et al. The prevalence, etiology and treatment of gastroduodenal ulcers and perforation: a systematic review. *J Clin Med*. 2024;13(4):1063.
14. John B, Mathew B, Chandran CV. Prevalence of Helicobacter pylori in peptic ulcer perforation. *Int Surg J*. 2017;4(10):3350-3.
15. Reinbach DH, Cruickshank G, McColl KE. Acute perforated duodenal ulcer is not associated with Helicobacter pylori infection. *Gut*. 1993;34(10):1344-7.
16. Tarasconi A, Coccolini F, Biffl WL, et al. Perforated and bleeding peptic ulcer: WSES guidelines. *World J Emerg Surg*. 2020;15:3.
17. Thirupathaiah K, Jayapal L, Amaranathan A, et al. The association between Helicobacter pylori and perforated gastroduodenal ulcer. *Cureus*. 2020;12(3):e7406.
18. Sengupta S, Ramesh KH, Malik S, et al. Perforated peptic ulcer: a clinical study at Shri Shankaracharya Institute of Medical Sciences Bhilai, Chhattisgarh. *Int Surg J*. 2023;10(11):1771-6.
19. Zhang W, Liang X, Chen X, et al. Time trends in the prevalence of Helicobacter pylori infection in patients with peptic ulcer disease: a single-center retrospective study in Shanghai. *J Int Med Res*. 2021;49(10):3000605211051167.