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PREVALENCE OF ASSOCIATION OF HELICOBACTER PYLORI IN GASTRODUODENAL PERFORATION: A PROSPECTIVE STUDY

General Surgery

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ABSTRACT

Background: Gastroduodenal perforation is a surgical emergency, which is the leading cause of death, if not managed promptly and effectively. It is frequently the result of the infection caused by Helicobacter pylori (H. pylori) and application of non-steroidal anti-inflammatory medications (NSAID). H. pylori has been identified as the culprit in the case of peptic ulcer disease. However, its exact part in the events of gastrointestinal perforation is still being explored. **Objective:** This was a prospective observational study to ascertain the proportion of individuals with gastroduodenal perforation who had an H. pylori infection and to correlate it with demographic parameters and clinical symptoms. **Methods:** This study was undertaken over 18 months (2023–2024) at the BRD Medical College, Gorakhpur, and comprised 100 surgically treated patients who were diagnosed with gastroduodenal perforation. Intraoperative biopsy specimens were observed for H. pylori with the Rapid Urease Test (RUT). Demographic information, risk factors, clinical manifestations, and duration of symptoms were evaluated. **Results:** Eighty-seven percent of the 100 patients were male, and the majority of them belonged to the 41–60-year age group (35%). H. pylori was found in 36% of cases. There was no significant correlation between the H. pylori infection and duration of the symptoms (pain, vomiting, distension, obstipation). Both NSAID use and lifestyle exposures were prevalent in the cohort. **Conclusion:** The research shows a moderate rate of H. pylori in patients suffering gastroduodenal perforation. However, H. Pylori infection was not significantly associated with the clinical outcome. These data reinforce the multifactorial physiopathology of gastroduodenal perforation and urge multicentric studies.

KEYWORDS

Gastrointestinal perforation, non-steroidal anti-inflammatory drugs, gastric ulcers

INTRODUCTION

The two most frequent gastrointestinal tract perforations are still duodenal and gastric ulcers. A gastric perforation is a more dangerous condition marked by the formation of a hole or tear in the stomach wall, whereas a gastric ulcer is a particular area of inflammation or damage on the stomach lining. Gastric perforation commonly occurs as a consequence of untreated or inadequately controlled gastric ulcers.[1]

A common surgical emergency that can have potentially fatal consequences is a gastrointestinal perforation, which causes food to leak into the peritoneal cavity. Both spontaneous and traumatic gastric perforations are possible. Although there are other uncommon reasons, peptic ulcer disease (PUD) is the primary cause of spontaneous perforation. The two main factors implicated in the etiology are non-steroidal anti-inflammatory drugs (NSAIDS) and Helicobacter pylori (H. pylori).[2]

Helicobacter pylori is a spiral-shaped, Gram-negative bacterium that is known to affect more than 50% of people worldwide. Its prevalence varies by age, race, socioeconomic level, and geographic location. In many cases rates of infection start during infancy in developing countries. However, developed countries have exhibited a downward turn in H. pylori infection, mainly owing to better living standards and sanitation.[3-4]

Patients with perforated peptic ulcers have an average incidence of H. pylori infection of 65-70%, which may suggest that additional variables contribute to its pathophysiology.[5] In many countries, the incidence of H. pylori infection has been decreasing in association with an improved standard of living.[6]

With a 10% to 40% fatality rate, perforated duodenal ulcers in particular continue to be a frequent surgical emergency.[7] Perforations often affect 5-10% of patients with active ulcer disease and are seen in the first segment of the duodenum.[8]

This prospective study aims to investigate the incidence of H. pylori infection in patients who present with gastroduodenal perforation at BRD Medical College, Gorakhpur. It also searches for other risk factors that are associated with it, including the use of NSAIDs, smoking, drinking, being highly educated and having a low income.

Review Of Literature

A study conducted recently by Donda et al (2023) [9] reveals interesting findings, patients with gastroduodenal perforation who used NSAIDs also had an H. Pylori infection. Infection caused by helicobacter pylori bacteria often manifests subtly inside stomach lining over an extended period quite mysteriously. Sixty-nine percent of 100 patients who underwent surgery subsequently tested positive for H. Pylori. In their literature review on gastroduodenal perforation (GDP), Amalia et al. (2024) [10] discovered that Helicobacter pylori (H. pylori) is the primary cause of GDP, outperforming other therapies like NSAIDs, surgery, chemotherapy, or transplantation. According to the study, laparoscopic surgery shows lower rates of mortality and complications, suggesting that technological developments could improve GDP therapy. For GDP reduction and recovery, treating H. pylori infection is essential, but in severe instances, prompt action is needed.

Mahurkar et al., (2024) [11] examined the frequency and etiology of Helicobacter pylori infection in patients having perforated duodenal ulcers quite thoroughly investigation. Probe ensued in twenty twenty-four. Thirty patients aged between 18 and 75 having undergone surgery subsequently returned for post-operative follow-up and were included in study. Data demonstrated a considerable prevalence of H. pylori with a correlation at sixty percent. H. pylori persists in patients undergoing rigorous postoperative follow-up examinations regularly. NSAIDs, alcohol, and smoking were risk factors pretty clearly for developing perforated duodenal ulcers rather quickly in most cases. Healing gets promoted pretty quickly and H gets eliminated rather thoroughly, meanwhile underneath skin layers somehow daily. Treatment for pylori infection is utterly essential, apparently.

The prevalence of H. pylori infection in Pakistani patients with perforated peptic ulcers was examined in the Ullah et al. (2024) [12] study. 54.4% of the 171 participants in the cross-sectional study had a

positive history of NSAID use, suggesting that H. pylori infection is highly prevalent in peptic ulcer patients.

MATERIALS AND METHODS

Study Design: This was a prospective observational study conducted over 18 months (2023-2024) at the Department of General Surgery, BRD Medical College, Gorakhpur.

Study Population: A total of 100 patients diagnosed with gastroduodenal perforation and undergoing surgical intervention were enrolled.

Inclusion Criteria:

- Patients presenting with gastroduodenal perforation and peritonitis who underwent surgery.
- Patients who provided informed written consent.

Exclusion Criteria

- Perforations due to trauma (blunt or penetrating).
- Suspected malignant perforations.
- Patients who refused to participate.

Sampling Method and Size

The sample size (n=100) was calculated based on prior prevalence data (50%–80 %) of H. pylori infection, using a 95% confidence level and 5% error margin.

Data Collection Procedure:

- Detailed history, clinical examination, and baseline investigations were carried out.
- Emergency imaging (X-ray abdomen, USG, and/or CT abdomen) confirmed the diagnosis.
- During surgery, biopsy specimens from the edge of the perforation were collected and tested using the Rapid Urease Test (RUT) for H. pylori detection.
- Post-operative outcomes, including clinical features and complications, were recorded using a structured proforma.
- Patients were followed up for 30 days post-surgery.

Intervention: All patients underwent standard surgical closure using Graham's omental patch repair. Patients testing positive for H. pylori were treated post-operatively with a 14-day eradication regimen:

- Omeprazole 20 mg BID
- Tinidazole 500 mg BID
- Amoxicillin 750 mg BID

Data Analysis

MS Excel was used to enter the data, while SPSS version 26.0 was used for analysis. Frequencies and percentages were used to display categorical variables. Medians and interquartile ranges or means and standard deviations were used to summarize continuous variables. Associations between variables were evaluated using the chi-square test; a p-value of less than 0.05 was deemed statistically significant.

Ethical Considerations: Approval was obtained from the Institutional Ethics Committee, and informed consent was secured from all study participants.

RESULTS

This prospective observational study was conducted on 100 patients with gastroduodenal perforation, admitted to the emergency department of BRD Medical College, Gorakhpur, between 2023 and 2024.

The demographic analysis of the patient cohort revealed that the majority (35%) were in the 41–60 years age group, followed by 32% in the 21-40 years group, 23% over 60 years, and 10% aged 20 years or younger (Figure 1). A pronounced male predominance was observed, with males constituting 87% of the population, while females accounted for 13% (Figure 2). In terms of residence, 57% of the patients were from rural areas and 43% from urban settings. Regarding body mass index (BMI), 33% of patients had a BMI between 18.5–22.9 kg/m², 48% fell within the 23–24.9 kg/m² range, and 19% had a BMI of 25 kg/m² or higher. Helicobacter pylori status was assessed using the intraoperative Rapid Urease Test (RUT) on tissue samples obtained from the ulcer margins, which revealed that 36% of the patients tested positive for H. pylori infection.

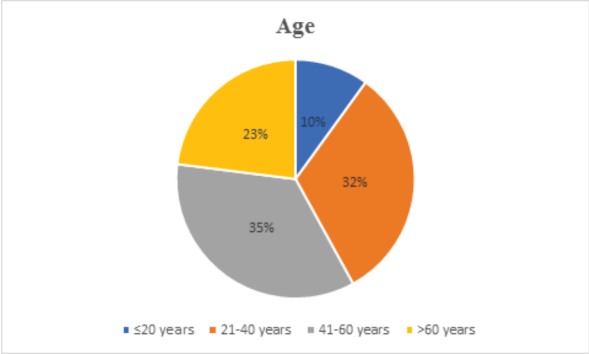

Figure 1: Age-wise Distribution of Patients With Gastroduodenal Perforation

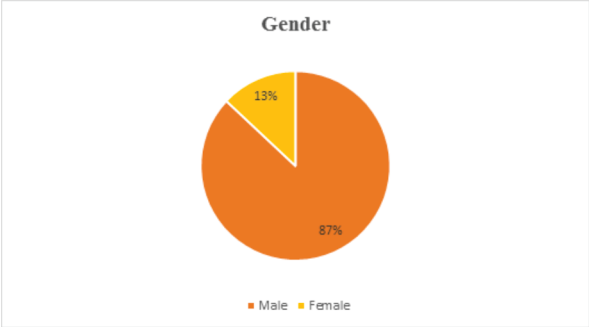

Figure 2: Gender-wise Distribution of Patients With Gastroduodenal Perforation

Table 1: Comparison of Symptom Duration Between H. Pylori Positive and Negative Patients

Symptom	H. pylori (+) Mean ± SD	H. pylori (–) Mean ± SD	p-value
Abdominal Pain (days)	3.72 ± 0.88	3.66 ± 0.91	0.726
Vomiting (days)	1.42 ± 0.60	1.38 ± 0.58	0.734
Abdominal Distension (days)	2.11 ± 0.82	2.08 ± 0.57	0.814
Obstipation	2.17±0.65	2.25±0.69	0.556

Table 1 presents the mean duration (in days) of key symptoms such as abdominal pain, vomiting, abdominal distension, and obstipation in patients with gastroduodenal perforation, categorized by H. pylori status. It includes the mean ± standard deviation (SD) values for each symptom in both H. pylori-positive and negative groups, along with corresponding p-values. The analysis reveals no statistically significant difference in symptom duration between the two groups, suggesting that H. pylori infection does not influence the clinical manifestation or progression of symptoms in perforation cases.

DISCUSSION

To ascertain the prevalence of Helicobacter pylori (H. pylori) in patients undergoing surgery for gastroduodenal perforation and to evaluate its clinical implications, this prospective study was carried out at BRD Medical College in Gorakhpur. The Rapid Urease Test (RUT) revealed that 36% of the 100 individuals who were assessed had positive H. pylori results, which is in line with the lower range of prevalence documented in Indian and international literature. Crucially, the study found no statistically significant variations in the duration of symptoms (pain, vomiting, distension, and obstipation) between groups that tested positive and negative for H. pylori. This suggests that H. pylori does not affect the clinical course after a perforation has occurred.

The prevalence of Helicobacter pylori infection typically occurs in childhood and persists lifelong in most individuals silently. A prospective study was carried out at BRD Medical College, Gorakhpur, evaluating H. pylori in patients undergoing gastroduodenal perforation surgery for various clinical implications 36% of 100 individuals assessed had positive H. pylori as revealed by Rapid Urease Test. H. Pylori results are largely in line with lower prevalence rates documented sporadically in both Indian literature and various international studies. Study findings crucially revealed no statistically significant symptom duration variations between H.

pylori-positive groups and those testing negative. Bacteria thrive quietly inside the stomach lining, known loosely as pylori. Evidence points rather heavily towards H. pylori being a viable notion. Pylori apparently have negligible impact on clinical course after perforation occurs suddenly in such cases.

These results demonstrate that H. pylori is simply one of several contributing factors to the complex pathophysiology of gastroduodenal perforation. This is consistent with the findings of Thirupathaiah et al. (2020) [5], who found no conclusive correlation between the severity of the perforation or its outcome, but observed a mean H. pylori prevalence of 60–70% in perforated ulcers. In a similar vein, 62% of patients with perforated ulcers tested positive for H. pylori, according to Gisbert et al. (2004) [7], who also observed that NSAID use was more common in those patients who tested negative for the bacteria.

Other research, however, indicates greater prevalence and more robust correlations. For example, Donda et al. (2023) [9] found a strong association between the use of NSAIDs and H. pylori infection in 69% of patients with gastroduodenal perforation. Mahurkar et al. (2024) [11] highlighted the necessity of eradication therapy to prevent recurrence by reporting a 60% positive rate in postoperative follow-up of patients with duodenal ulcers. Similarly, Ullah et al. (2024) [12] identified NSAID use as a prevalent co-factor and discovered a significant infection risk among instances with perforated peptic ulcers.

The reduced incidence in this study (36%) may be explained by regional variations in infection rates, past use of PPIs or antibiotics that can reduce the bacterial load, or restrictions in RUT sensitivity brought on by tissue necrosis at the ulcer site. Furthermore, Zamani et al. (2018) [3] imply that socioeconomic and regional factors have a substantial impact on the epidemiology of H. pylori infection.

It's interesting to note that our research supports the findings of Amalia et al. (2024) [10], who stressed that while Helicobacter pylori continues to play a significant role in gastroduodenal ulcer illness, it is not the only factor that causes perforation. Additionally, they promoted a multifactorial concept of perforation that took into account variables like host immunity, alcohol, smoking, and NSAIDs.

Although this study backs up the need for routine H. pylori testing and removal in ulcer perforation cases, it also raises the possibility that H. pylori status alone may not have a substantial impact on surgical decision-making or postoperative results. This emphasizes the necessity of a more comprehensive therapeutic framework that incorporates customized post-operative care and risk factor minimization.

CONCLUSION

The current study shows that H. pylori is more prevalent in cases of gastroduodenal perforation, but it does not provide evidence of a direct or dominant involvement in the length of symptoms or the result of surgery. Despite being in line with a number of domestic and foreign research studies, these results also demonstrate the variation in H. pylori prevalence and its clinical significance. To more clearly define the role of H. pylori in the pathophysiology and prognosis of perforated peptic ulcer disease, larger multicentric studies with longer follow-up and combined diagnostic modalities (histology, serology, PCR) are necessary.

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