Original Article

# Profile of Gastroduodenal Perforation Patients Admitted in a Rural Tertiary Care Hospital: An Observational Cross-Sectional Study

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## Abstract

**Background:** Gastro-duodenal perforation is a common surgical emergency that remains a formidable health burden worldwide with significant morbidity and mortality. Ulcer disease remains the most common cause of gastro-duodenal perforation. Diagnosing the presence of *H. pylori* can help eradicate the infection from the community at large and thereby reduce the chances of gastro-duodenal perforation. **Aims:** To assess the clinical presentation of gastro-duodenal perforation patients and to evaluate the detection of *Helicobacter pylori* infection by available investigations. **Materials and Methods:** A descriptive observational study was conducted among 80 patients presenting with clinical features suggestive of gastro-duodenal perforation and confirmed by clinical, radiological basis and operative findings admitted at a rural tertiary care hospital during 2019-2020. Detailed history was taken from the patient/party, clinically examined, and blood/tissue samples were investigated. The patients were managed with standard treatment modality in the studied institute. Data were collected, compiled, and entered MS Excel and analyzed using appropriate software. Descriptive analysis was done in the form of proportion for categorical variables, mean or median for continuous variables. **Result:** Cases of gastro-duodenal perforations were more among middle to later age of life, mostly affecting married male patients hailed from rural area and unskilled workers. History of intake of spicy food, prolonged starvation, history of NSAID use were common among them. Majority of the patients had history of pain abdomen in the past suggesting of PUD and history of taking variety group of acid reducing agents. Most of them presented with epigastric pain, vomiting, abdominal distension along with other signs of peritonitis. Obliteration of liver dullness and free gas under right dome of diaphragm was also noted in large proportion among them. Majority of cases were found positive for *H. pylori* on Histology (85%), followed by rapid urease test (RUT) (80%) and a positivity of 72.5% and 68.8% on serum IgG and IgA antibody respectively. Rapid Urease Test was more sensitive as well as specific in diagnosing of *H. pylori* than antibody detection test. **Conclusion:** Early detection of *H. pylori* infection and treatment with potent anti *H. pylori* therapy postoperatively has been found to be adequate.

**Keywords:** *Gastroduodenal perforation, H. pylori, tertiary hospital*

## Introduction

Perforation of gastric or duodenal ulcers is one of the most serious and devastating catastrophic events that are affecting human beings.[1] Early and prompt recognition and treatment of the condition are thus very crucial to reduce the still relatively high mortality.[2] *Helicobacter pylori* infection is the most common cause of chronic gastritis, gastric ulcer, peptic ulcer, gastric adenocarcinoma, and lymphoma. Hence, early and accurate detection of this organism is essential for complete eradication by using triple therapy, thereby preventing the dreadful consequences.

There are few numbers of studies in this part of the country on this issue despite the large number of cases of gastroduodenal perforation. Diagnosing the presence of *H. pylori* in these patients can help eradicate the infection from the community at large and thereby reduce the chances of gastroduodenal perforation. This is why this study was planned to evaluate the detection of *H. pylori* infection by available investigations among these patients with the following objectives: to assess the clinical presentation and to detect the presence of *H. pylori* infection by histological examination, rapid urease test (RUT) and serological test (IgG and IgA) among gastroduodenal perforation patients.



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## Materials and Methods

An institution-based observational descriptive study with a cross-sectional design was conducted in between May 2019 and April 2020 in the Department of General Surgery (in patient department and surgery casualty ward) of North Bengal Medical College and Hospital, located near Siliguri town of Darjeeling district of West Bengal. It is the largest health care facility in the North Bengal region of West Bengal, serving as a tertiary referral institute covering more than six districts of the state of West Bengal and covering places from allied border regions of the other three countries like Nepal, Bhutan, and Bangladesh.

The study population was all the adult patients presenting with a diagnosis of gastroduodenal perforation confirmed by clinical, radiological basis and operation findings at surgery ward in North Bengal Medical College and Hospital fulfilling following criteria: inclusion criteria: diagnosed cases of gastroduodenal perforation, patients' age of at least 18 years and exclusion criteria: patients who did not give consent to participate, who had diagnosis of preoperative and/or perioperative malignancy, established diagnosed case of traumatic perforation and multiple site gastrointestinal perforations.

There was a total of 116 patients presented with a confirmed diagnosis of gastroduodenal perforation on a clinical and radiological basis and operative findings at the surgery ward of NBMCH during the study period. After applying the selection criteria, 80 patients were approached and enrolled in the study. Collected data were compiled, edited, and entered in an MS Excel data sheet and analyzed using the help of the software IBM SPSS for Windows, version 22 (IBM Corporation, Armonk, New York). Descriptive analysis was done in the form of proportion for categorical variables, mean or median for continuous variables.

Ethical approval was obtained from the Institutional Ethics Committee (IEC) of North Bengal Medical College and Hospital. Parents or relatives of the patient were explained in their own language about the nature of the study and procedures. They were assured about the confidentiality of information and its anonymity. No additional investigation or interventions were undertaken other than what the subjects required for the management purpose of the illness. Informed consent from the parents and legal guardians of the subjects was taken after they understood the participant information sheet, which was provided to them and printed in their own language. All the materials required for the examination of the patients were available in the different departments of the studied institution, i.e., General Surgery, Microbiology, Biochemistry, and Radiology.

## Results

The findings of the present study have been described according to the prestated objectives and are as follows: the mean age of the patients was 45.08 (±13.07) years, with male preponderance (91.3%) [Table 1]. The majority of the subjects were in the age group of 46–60 years (45%), followed by 31–45 years (26.3%), and 8.7% belonged to the geriatric age group. Around three-fourths of the patients were Hindus, 22.5% were Muslims, and most of them hailed from rural areas (66.3%). More than half of the patients were unskilled workers (53.6%), followed by skilled workers (23.8), and the majority of them were found married (85%) [Table 1]. Almost 60% of the patients with gastroduodenal perforation had a history of intake of spicy food [Table 2].

**Table 1: Distribution of the study participants according to background characteristics (*n* = 80)**

| Sociodemographic parameters | Frequency | Percentage |
|---|---|---|
| Age group | | |
| <45 years | 37 | 46.3 |
| ≥45 years | 43 | 53.7 |
| Gender | | |
| Male | 73 | 91.3 |
| Female | 7 | 8.7 |
| Religion | | |
| Hinduism | 62 | 77.5 |
| Islam | 18 | 22.5 |
| Place of residence | | |
| Rural | 53 | 66.3 |
| Urban | 27 | 33.7 |
| Occupation | | |
| Skilled | 19 | 23.8 |
| Unskilled | 43 | 53.6 |
| Others | 18 | 22.6 |
| Total | **80** | **100** |

**Table 2: Distribution of the study participants according to dietary/drug history-related parameters (*n* = 80)**

| Dietary/drug history-related parameters | Frequency | Percentage |
|---|---|---|
| H/O prolonged fasting | | |
| Yes | 54 | 67.5 |
| No | 26 | 32.5 |
| H/o eating spicy food | | |
| Yes | 48 | 60 |
| No | 32 | 40 |
| H/O substance abuse | | |
| Absent | 46 | 57.5 |
| Tobacco | 15 | 18.8 |
| Alcohol | 16 | 20 |
| Both | 3 | 3.8 |
| Type of acid-reducing substance | | |
| H2 receptor blocker | 17 | 37.8 |
| PPI | 15 | 33.3 |
| Antacid | 13 | 28.9 |
| Absent | 35 | 43.8 |
| H/O taking NSAIDs frequently | | |
| Yes | 57 | 71.3 |
| No | 23 | 28.7 |
| Total | **80** | **100** |

**Table 3: Distribution of the study participants according to clinical parameters (*n* = 80)**

| Clinical parameters | Frequency | Percentage |
|---|---|---|
| H/O abdominal pain | | |
| Yes | 55 | 68.7 |
| No | 25 | 31.3 |
| H/O epigastric pain | | |
| Yes | 76 | 95 |
| No | 04 | 5 |
| H/O vomiting | | |
| Yes | 70 | 87.5 |
| No | 10 | 12.5 |
| Abdominal distension and signs of liver dullness obliteration | | |
| Present | 64 | 80 |
| Absent | 16 | 20 |
| Signs of peritonitis | | |
| Present | 73 | 91.2 |
| Absent | 07 | 8.8 |
| Gas under diaphragm (X-ray finding) | | |
| Present | 70 | 87.5 |
| Absent | 10 | 12.5 |
| Total | **80** | **100** |

The majority of the patients had a history of prolonged starvation (67.5%), and 71.3% of the subjects had a history of taking NSAIDs frequently. About 20% of the patients confessed to consume alcohol and 18.8% were reported consuming tobacco (smoke/smokeless), 3.8% were abusing both, while 57.5% of the patients had no history of any substance abuse [Table 2]. The majority (56.2%) of patients had taken some treatment in the form of antacid, H-2 blocker, or proton pump inhibitors, while 43.8% patients had no history of intake of any acid-reducing agents. Among them, 37.8% subjects taken H2 receptor antagonists, 33.3% taken proton pump inhibitors (PPI), and 28.9% taken antacid preparation [Table 2].

Almost 68.7% patients had a history of pain in the abdomen in the past, suggesting PUD, and the majority of them had epigastric pain (95%). 87.5% patients had complaints of vomiting along with other features, and 80% patients had signs of obliteration of liver dullness on clinical examination [Table 3]. The majority of the patients presented with abdominal distension (80%) and signs of peritonitis (83.7%) at the time of admission to the emergency ward. On a straight X-ray abdomen, free gas under the right dome diaphragm was found in 87.5% patients, and the majority of patients had increased TLC [Table 3].

Further examination of subjects revealed that the majority (80%) were positive for *H. pylori* on RUT, whereas 20% reported negative. About 72.5% of the patients were found IgG positive (72.5%) for *H. pylori*, whereas 68.8% were found IgA positive. Histology findings have shown that 85% of the patients were positive for *H. pylori* [Table 4].

Assessment of the validity of different tests revealed that RUT was most sensitive as well as specific diagnosing

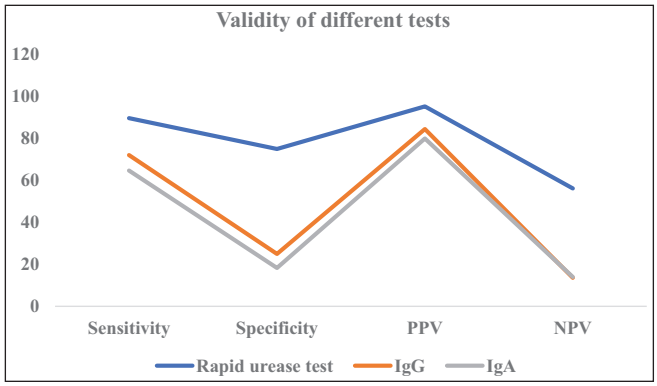


**Figure 1: Validity of different tests performed among the study subjects (*n* = 80)**

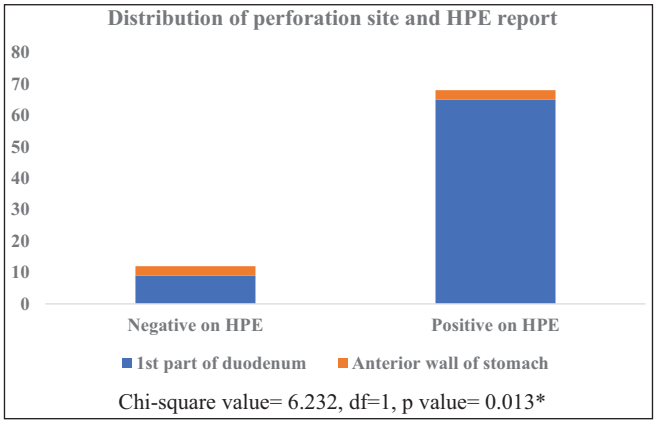


**Figure 2: Distribution of the perforation sites with a result of histopathological examination (*n* = 80) Chi-square value = 6.232, df = 1, *P*-value = 0.013***

*H. pylori* infection than serum IgG and IgA antibody detection [Figure 1]. In patients with perforation of the first part of the duodenum, 87.8% were found positive on histology for *H. pylori*, whereas, among patients with perforation of the anterior wall of the stomach, 50% were found positive on histology for *H. pylori*. This difference in proportions was statistically significant (*P*-value = 0.013) [Figure 2].

## Discussion

The present study showed that the mean age was 45.08 years, and the majority of the subjects were in the age group of 46–60 years (45%). The finding corroborates with the findings by Kuremu *et al.*,[3] which reported the mean age was 47 years, and the observation reported by Nuhu *et al.*,[4] where the mean age of the patients was 45.5 years. However, the mean age of the patients is higher than the findings of a study done by Ersumo *et al.*[5] (32.6 years) and lesser than a study conducted by Ohene-Yeboah *et al.*[6] (52.2 years). Male patients were outnumbered in the present study. Similar observations had been reported by Aman *et al.*,[7] Kuremu *et al.*,[3] and Ohene-Yeboah *et al.*[6] The magnitude of male preponderance could probably be explained by the fact that males are generally more aggressive in nature and thus predisposed to risky behavior more than females,

**Table 4: Distribution of the study participants according to different lab investigation-related parameters ($n$ = 80)**

| Lab investigation-related parameters | Frequency | Percentage |
|---|---|---|
| Total leukocyte count | | |
| Raised | 61 | 76.2 |
| Normal | 19 | 23.8 |
| Perforation site | | |
| 1st part of the duodenum | 74 | 92.5 |
| Anterior wall of the stomach | 06 | 7.5 |
| Rapid urease test | | |
| Positive | 64 | 80 |
| Negative | 16 | 20 |
| IgG for *H. pylori* | | |
| Positive | 58 | 72.5 |
| Negative | 22 | 27.5 |
| IgA for *H. pylori* | | |
| Positive | 55 | 68.8 |
| Negative | 25 | 31.3 |
| Histology for *H. pylori* | | |
| Positive | 68 | 85 |
| Negative | 12 | 15 |
| Total | **80** | **100** |

leading to gastroduodenal perforation. Male predominance may be attributed to substance abuse of alcohol and smoking.

Most of the participants in the current study were from rural residences (66.3%), and 33.7% were from urban areas, which is similar to the finding observed by the study of Schabowski *et al.*,[8] but it contradicts the findings of the study done by Zangana and Garota,[9] where they reported patients residing in the rural areas had a lower incidence of perforations (39%). This may be explained by the fact that the present study was conducted at a rural tertiary hospital. This study revealed that more than half of the patients were unskilled workers (53.6%), followed by skilled workers (23.8), and a similar (8.8%) proportion of homemakers and service/business-men. These findings corroborate with the findings reported by Kumar *et al.*[10] It is believed that duodenal ulcer perforation occurs in those people who are engaged in heavy manual labor. As the studied hospital is in a rural area, patients seeking healthcare here belong to low socioeconomic status and are mostly unskilled workers; hence, perforation was more common in this group.

The present study found that around three-fourths of the patients were Hindus and 22.5% were Muslims and most of them were married (85%), which corresponds to the study done by Saha *et al.*,[11] which also reported most of the patients suffering from perforated ulcer were Hindus and married persons were the commonest. The beneficiaries of the studied hospital are mostly Hindus, and this has been reflected in the findings of the present study. It has been noted that 60% of the patients with gastroduodenal perforation had a history of intake of spicy food, and 67.5% had a history of prolonged fasting, which is similar to the study of Mathur *et al.*[12] and Sarda *et al.*[13] Relation of empty stomach, prolonged fasting, and intake of spicy food causing duodenal ulcer perforation can be explained by missing one of the important three daily meals during fasting, with prolonged nonneutralization of gastric acidity can decrease the defensive mechanisms of gastric mucosa causing ulcer and then perforation.

Alcohol is known to impair wound healing through a variety of mechanisms: nutritional deficiencies leading to impaired wound healing and dis-inhibition caused by alcohol leads to increased risk behavior, hence more predisposition to gastroduodenal ulcer perforation than in abstainers. Silverstein[14] documented the effects of the toxic constituents of cigarette smoke, particularly nicotine, carbon monoxide, and hydrogen cyanide, and suggested potential mechanisms by which smoking may undermine expeditious wound repair. This could also explain the toxic effects of cigarette smoking, leading to perforation of gastroduodenal ulcers. The present study reported that 20% of the patients were consuming alcohol, 18.8% were consuming tobacco (smoke/smokeless), and 3.8% were abusing both. On contrary to this, a much higher prevalence was reported by Zangana [9] in which 65% of the cases were smokers. Similarly, a study done by Sarda *et al.*,[13] found 64% patients had a history of smoking, and 30.6% had a history of tobacco intake.

Current study findings showed 71.3% of the subjects were taking NSAIDs. Like this in a study by Torab *et al.*[15] reported NSAIDs as one of the common risk factors for perforation. In a study by Horowitz *et al.*,[16] it was found that 50% of patients with perforated duodenal ulcers had a prior history of NSAIDs use. The present study also reported that the majority (56.2%) of patients had taken some treatment in the form of different acid-reducing substances, and among them, 37.8% subjects had taken H2 receptor antagonist, 33.3% PPI, and 28.9% antacid preparations. In contrary to this finding, in a study done by Sharma *et al.*,[17] showed that 77% patients had no history intake of any acid-reducing substance. In some other studies conducted by Sarath *et al.*[18] Mittal *et al.*[19] shown that H2 receptor blockers were the most consumed ulcer healing drugs, which corroborates with the findings of the current observation.

Among the admitted patients, it was observed that 95% patients had severe epigastric pain, 80% had abdominal distension, and 87.5% had vomiting during admission. On further examination, it was found that 83.7% patients had signs and symptoms of peritonitis, and in 80% cases, there was obliteration of liver dullness. Similar findings were reported by Kumar *et al.*[10] and Sarda *et al.*[13] On a straight X-ray abdomen, free gas under the diaphragm was found in 87.5% patients, and the majority of patients had increased total leukocyte count. Kumar *et al.*[10] found gas

under the diaphragm in 98% of cases, which was slightly higher than the present study. In contrary to this, Dodiyi Manuel *et al.*[20] observed gas under the diaphragm in 61.1% of cases, which was much lower than our study.

In a study by Saha *et al.*[11] observed that RUT, an indicator of *H. pylori* infection, was positive in 82% patients of with peptic perforation. The present study has reported almost a similar result (80%). In a few other studies, like Dogra *et al.* (92%)[21] and Sebastian *et al.* (83.3%),[22] also reported a similar proportion of positive rate of RUT among perforated peptic ulcer patients. This study revealed that serum samples of the majority of the patients were IgG positive (72.5%) for *H. pylori,* and 68.8% were found IgA positive. This finding corresponds to the study done by Martín-de-Argila *et al.*[23]

Lastly, in the present study, 68 out of 80 patients (85%) were positive for *H. pylori*. They were given anti-*H. pylori* treatment by administration of standard triple therapy for 14 days at the time of discharge, the remaining 12 patients were given only Capsule Lansoprazole 30 mg twice a day for 14 days. There was a significant decrease in postoperative symptoms in patients who were given anti-*H. pylori* treatment, following the closure of perforation, which was similar to the findings of Dogra *et al.*[21] Definitive surgeries such as truncal vagotomy and pyloroplasty or gastrojejunostomy were avoided in all the cases.

## Conclusion

The present study indicates a high prevalence of *H. pylori* infection in patients with perforated peptic ulcers, thereby proving the role of *H. pylori* infection as one of the most important etio-pathological factors for gastroduodenal perforations. The high positive predictive value of RUT indicates the potential for it being a screening test for *H. pylori* infections. Thus, an early detection of *H. pylori* and potent anti-*H. pylori* therapy postoperatively has been found to be adequate in the complete healing of these ulcers after operative closure of the ulcer.

Perforation of peptic ulcer is one of the more common causes which require emergency laparotomy. It would be necessary for policymakers to put a stop to the activities of untrained medical personnel, who are the first attendants to see these acutely ill patients so that these patients can present earlier to definitive care centers for accurate and timely diagnosis and management of this surgical emergency. Encouragement on cessation of smoking and alcoholic intake may help change the demography of patients in this environment with PUD and its complications. Also, awareness should be generated regarding the adverse effects of NSAIDs, and their use should be regulated. Young adults should be counseled regarding irregular food habits like avoiding spicy foods, carbonated drinks, coffee, and outside foods. Fasting and taking less than two meals per day should be avoided. Serology is a good alternative to the already established role of RUT, with minimal invasion, but RUT is a more specific and sensitive method of screening. Patients presenting with peptic perforations must be given *H. pylori* eradication therapy postoperatively for complete healing of these ulcers after operative closure.

### Limitations

The present study, being an institution-based cross-sectional study design, limits the causality of relations. To evaluate the efficacy of different investigation modalities for *H. pylori,* there is a need for doing experimental study with an adequate sample size.

### Conflict of interest

There was no conflict of interest.

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