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Frequency of Helicobacter Pylori Infection in Patients with Gastroduodenal Ulcer Perforation at Ayub Teaching Hospital Abbottabad

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ABSTRACT

Background: Gastro duodenal ulcer perforation is an emergency condition which cause leakage of gastric contents into abdominal cavity and can leads to sepsis if not treated early. Helicobacter pylori infection is considered important factor in ulcer diseases but its frequency in perforation cases in this region is not well known. **Objective:** To determine frequency of Helicobacter pylori infection in patients with gastro duodenal ulcer perforation. **Study Design:** Cross sectional study. **Duration and Place of Study:** This study was conducted from 27 February 2025 to 27 May 2025 in Department of Surgery Ayub Teaching Hospital Abbottabad. **Methodology:** Total 218 patients of both gender with age 18 to 70 years were included. Helicobacter pylori infection was assessed by available diagnostic methods. Data was analysed by statistical package for social sciences version 27. Stratification was done and Chi square test or Fisher exact test was applied, p value ≤0.05 was taken as significant. **Results:** Mean age was 48.93 ± 14.34 years. Male were 144 (66.1%) and female were 74 (33.9%). Helicobacter pylori infection was present in 152 (69.7%) patients while 66 (30.3%) were negative. No significant association was found with age (p=0.799), gender (p=0.170), body mass index (p=0.451), socioeconomic status (p=0.279), education (p=0.134), residence (p=0.064) and duration (p=0.702). **Conclusion:** Helicobacter pylori infection is common in patients with gastro duodenal ulcer perforation and may have important role in disease, but no significant association with demographic factors was seen.

INTRODUCTION

The Gastro-Duodenal Ulcer Perforation is defined as an acute condition that involves rupture of the lining of the stomach or duodenum causing escape of the stomach contents into the peritoneum cavity.[1] This medical condition causes sudden abdominal pain and rigidity; failure to treat may result in complications such as sepsis.[2] It is most common in older patients especially adult males although it can be found in females and elderly people due to medication usage.[3] Diagnosis is mainly clinical but confirmation involves the use of imaging techniques like an erect Chest X-ray which shows free gas under the diaphragm.[4]

There are various reasons for the formation of holes in the gastro-duodenal ulcers, with untreated or poorly treated chronic peptic ulcers being considered the most prevalent pre-condition.[5] NSAIDs have been established to be one of the most important factors because they prevent mucosal protection and increase the damage caused by acid.[6] Similarly, smoking and alcohol consumption play an important role by inhibiting mucosal healing and increasing the production of acid in the stomach.[7]

The Helicobacter pylori bacterium is closely associated with peptic ulcers, and it makes up a significant proportion of the population in people with ulcers that perforate the stomach and the duodenum.[8] The bacteria infect the gastric mucosa, causing inflammation that damages the mucosal lining and increases the chances of acid damage.[9] There is ample evidence that H. pylori bacteria are prevalent in the presence of perforated ulcers, although this is subject to variation based on past antibiotic treatment or acute stress reactions.[10] Diagnostic tests include histological, urease tests, or serology, although there could be limitations in an emergency situation.

There is a lack of information available regarding the involvement of Helicobacter pylori in cases of gastro-duodenal ulcer perforation patients from Abbottabad, even though there is a high incidence rate of peptic ulcers in the area. Differences in food consumption, NSAID consumption, and health care availability among others can influence the pattern and course of the disease among the population of the region. Knowing the percentage of patients with Helicobacter pylori infection in such a medical emergency situation will assist in proper

treatment after surgery and in preventing recurrence.

METHODOLOGY

This cross-sectional study was carried out in the Department of Surgery at Ayub Teaching Hospital Abbottabad from 27th February 2025 to 27th May 2025. Ethical approval was taken from the institutional ethical review committee prior to commencement of the study and CPSP. A total of 218 patients were enrolled. Sample size was calculated by using WHO sample size software, taking 95% confidence interval, 5.5% margin of error and expected frequency of Helicobacter pylori infection as 78% in patients undergoing surgery for gastroduodenal perforation at tertiary care hospital.[11] Non-Probability consecutive sampling technique was applied for recruitment of participants.

Inclusion criteria

Patients were included having age between 18 to 70 years, of both genders, and having confirmed diagnosis of gastroduodenal ulcer perforation.

Exclusion criteria

Patients were excluded if perforation was due to causes other than peptic ulcer such as malignancy, Crohn's disease, trauma or other gastrointestinal conditions. Those patients were also excluded who had history of previous gastric surgery including gastrectomy or bariatric procedures. In addition, patients who had taken antibiotics or proton pump inhibitors within last 4–6 weeks were not included due to possible interference with detection of Helicobacter Pylori.

Gastroduodenal ulcer perforation was taken as presence of defect in stomach or duodenal wall leading to leakage of contents into abdominal cavity, associated with severe abdominal pain having value ≥7 on UPAT scale along with rigidity, guarding and generalised tenderness, and confirmed by imaging showing air under diaphragm on X-ray or CT scan, or direct confirmation during surgical exploration.

After taking written informed consent data collection was started. Purpose, possible benefits and risks were explained to all patients. Demographic variables including age, gender, BMI, education level, residence, socioeconomic status and duration of complaints were recorded. Detailed clinical history and physical examination was performed in all patients. Patients were managed according to standard surgical protocols. The appropriate tests, such as a simple abdominal X-ray, were done where necessary. The surgical interventions were made where needed, and the findings during the surgery were noted. Testing or examination of specimens was done to determine whether there was Helicobacter pylori infection, and results were appropriately documented. Following the operation and postoperative assessment, there was evidence of the presence of Helicobacter pylori infection when there was detection of the presence of the bacteria in the gastrointestinal system using any of the tests.

All collected data was entered and analysed using IBM SPSS version 27. Quantitative variables such as age, BMI and duration of complaints were expressed as mean±SD. Qualitative variables including gender, socioeconomic status, education level, residential status and presence of Helicobacter Pylori infection were presented as frequencies and percentages. Stratification was done for age, gender, BMI, socioeconomic status, education level, duration of complaints and residential status. Post stratification Chi square test or Fisher exact test was applied where appropriate and p value ≤0.05 was taken as statistically significant.

RESULTS

A total of 218 patients were included in the study. The mean age of the patients was 48.93 ± 14.34 years, with a mean body mass index (BMI) of 28.92 ± 3.41 kg/m^2 and a mean duration of symptoms of 7.97 ± 5.62 days. With regards to gender distribution, majority of the patients were male, accounting for 144 cases (66.1%), whilst female patients constituted 74 cases (33.9%). In terms of socioeconomic status, the largest proportion of patients belonged to poor socioeconomic background, comprising 129 individuals (59.2%), followed by middle class with 54 patients (24.8%), and high socioeconomic status with 35 patients (16.1%). With respect to educational level, most patients were uneducated, constituting 85 individuals (39.0%), followed by primary level education with 64 patients (29.4%), secondary level with 49 patients (22.5%), and higher education with 20 patients (9.2%). Regarding residential status, majority of the patients were from rural areas, comprising 123 individuals (56.4%), whilst 95 patients (43.6%) belonged to urban areas (Table-1).

Table 1

Patient Demographics (n=218)

Demographics		Mean ± SD / n (%)
Age (years)		48.93 ± 14.34
BMI (kg/m^2)		28.92 ± 3.41
Duration (days)		7.97 ± 5.62
Gender	Male n (%)	144 (66.1%)
	Female n (%)	74 (33.9%)
Socioeconomic Status	Poor n (%)	129 (59.2%)
	Middle n (%)	54 (24.8%)
	High n (%)	35 (16.1%)
Education Level	Uneducated n (%)	85 (39.0%)
	Primary n (%)	64 (29.4%)
	Secondary n (%)	49 (22.5%)
	Higher n (%)	20 (9.2%)
Residential Status	Rural n (%)	123 (56.4%)
	Urban n (%)	95 (43.6%)

With regards to the frequency of Helicobacter pylori infection amongst patients presenting with gastroduodenal ulcer perforation, the infection was identified in 152 patients, which corresponds to 69.70% of the total study population, whilst the remaining 66 patients (30.30%) were found to be negative for the infection (Table 2).

Table 2

Frequency of Helicobacter Pylori Infection in Patients with Gastroduodenal Ulcer Perforation (n=218)

Helicobacter Pylori	Frequency	% age
Yes	152	69.70%
No	66	30.30%
Total	218	100%

In the stratified analysis examining the association of H. pylori infection with various demographic factors, H. pylori positivity was observed in 48 patients (68.6%) in the age group of ≤45 years and in 104 patients (70.3%) in those aged >45 years, with no statistically significant difference been noted between the two age groups (p = 0.799). With reference to gender, H. pylori infection was present in 96 male patients (66.7%) and in 56 female patients (75.7%), and the association was not found to be statistically significant (p = 0.170). Regarding BMI, H. pylori positivity was recorded in 27 patients (75.0%) with BMI ≤25 kg/m^2 and in 125 patients (68.7%) with BMI >25 kg/m^2, with p-value of 0.451 which indicate no significant association. In terms of socioeconomic status, H. pylori was positive in 94 patients (72.9%) from poor background, 33 patients (61.1%) from middle class, and 25 patients (71.4%) from high socioeconomic class, with no significant association been found (p = 0.279). As far as education level is concerned, H. pylori positivity was seen in 67 uneducated patients (78.8%), 40 patients with primary education (62.5%), 32 patients with secondary education (65.3%), and 13 patients with higher education (65.0%), and the difference was not statistically significant (p = 0.134). With respect to residential status, H. pylori infection was identified in 92 rural patients (74.8%) and 60 urban patients (63.2%), with a p-value of 0.064 which suggest a trend but falling short of statistical significance. Finally, regarding duration of symptoms, H. pylori was positive in 94 patients (70.7%) with symptom duration of ≤7 days and in 58 patients (68.2%) with duration of >7 days, and no significant association was demonstrated (p=0.702) (Table 3).

Table 3

Association of Helicobacter Pylori Infection with Demographic Factors

Demographic Factors	Subgroups	H. Pylori		p-value*
		Yes n (%)	No n (%)	
Age (years)	≤45	48 (68.6%)	22 (31.4%)	0.799
	>45	104 (70.3%)	44 (29.7%)	
Gender	Male	96 (66.7%)	48 (33.3%)	0.170
	Female	56 (75.7%)	18 (24.3%)	
BMI (kg/m^2)	≤25	27 (75.0%)	9 (25.0%)	0.451
	>25	125 (68.7%)	57 (31.3%)	
Socioeconomic Status	Poor	94 (72.9%)	35 (27.1%)	0.279
	Middle	33 (61.1%)	21 (38.9%)	
	High	25 (71.4%)	10 (28.6%)	
Education Level	Uneducated	67 (78.8%)	18 (21.2%)	0.134
	Primary	40 (62.5%)	24 (37.5%)	
	Secondary	32 (65.3%)	17 (34.7%)	
	Higher	13 (65.0%)	7 (35.0%)	
Residential Status	Rural	92 (74.8%)	31 (25.2%)	0.064
	Urban	60 (63.2%)	35 (36.8%)	
Duration (days)	≤7	94 (70.7%)	39 (29.3%)	0.702
	>7	58 (68.2%)	27 (31.8%)	

*Chi-Square Test

DISCUSSION

A total of 218 patients took part in this study. The large percentage of men in the population (144; 66.1%) may support the assumption that due to male sex hormones in addition to increased smoking rate and alcoholism among men, there is a reduction of protection of gastric mucosa, hence making the patients susceptible to ulcers. In addition, the mean age of participants in this study was found to be 48.93 ± 14.34. More than half of the patients involved in this study, 129; 59.2%, were categorized as belonging to lower socioeconomic status which might probably be due to over-crowdedness and poor hygiene that favors faeco-oral/oral-oral transmission of Helicobacter pylori. The prevalence of infection of Helicobacter pylori among the participants was found to be 152 (69.70%), which is fairly high considering the fact that the bacterial species is well known to reduce the integrity of gastric mucosa through its virulence factor, including CagA and VacA, leading to ulcer perforation. There was no statistically significant correlation between H. pylori infection and patient age, gender, BMI, socioeconomic status, educational attainment, residence, or symptom duration.

The frequency of H. pylori infection in patients with gastroduodenal ulcer perforation was found to be 152 (69.70%) in the present study, which is comparatively higher than several previously reported studies. Donda NV *et al.* [12] reported a similar H. pylori positivity of 69% in 100 surgically managed gastroduodenal perforation patients, and Zahid Aman *et al.* [13] also reported a closely comparable frequency of 68% in perforated duodenal ulcer patients, which does suggest that in developing countries with poor sanitation and overcrowding, the faeco-oral transmission of H. pylori remain persistently high and does contribute to sustained mucosal damage through urease production and inflammatory cascade activation. In contrast, Katavath Thirupathaiah *et al.*[14] reported a considerably lower H. pylori prevalence of only 12.5% by rapid urease test in perforated peptic ulcer patients, and Dinesh Kumar Sathanantham *et al.* [15] reported an extremely low frequency of only 2.2%, which are notably different from the present findings and may be explained by differences in diagnostic methodology, geographic variation in bacterial strain virulence, and possible masking of infection due to prior antibiotic use in study populations.

The male predominance observed in the present study with 144 males (66.1%) is consistent with findings reported by Mukadam PN *et al.* [16] who noted 90% male prevalence, Asad Ullah *et al.* [17] who reported 90.59% males, and Francois Adrien Morel Bokalli *et al.* [18] who reported a male to female ratio of 5:1, which is scientifically attributed to the protective role of oestrogen on gastric mucosa and higher prevalence of smoking and alcohol consumption in males that does impair mucosal prostaglandin synthesis and compromise the gastric defence barrier. Shabbir Ahmed *et al.* [19] similarly demonstrated significantly higher H. pylori positivity in males (p=0.006), further supporting the gender-related vulnerability observed in the present and comparable studies.

With regards to socioeconomic and demographic characteristics, the present study noted that majority of patients 129 (59.2%) belonged to poor socioeconomic class, which is in agreement with Atta Muhammad Khan *et al.* [20] who emphasised socioeconomic and environmental determinants as major contributors to H. pylori transmission, as poor living conditions does facilitate person-to-person spread of the bacterium *via* contaminated water and food sources. The mean age of

48.93 ± 14.34 years in the present study is somewhat higher than that reported by Atta Muhammad Khan *et al.* [20] who found a mean age of 35 ± 1.26 years and Francois Adrien Morel Bokalli *et al.* [18] who reported mean age of 40 years, which may reflect differences in the age structure of the study populations or delayed presentation to surgical care in lower resource settings. No statistically significant association was found between H. pylori positivity and any of the demographic variables examined in the present study, which is similarly reported by Dinesh Kumar Sathanantham *et al.* [15] who found no significant association with age ($p>0.05$), and this may be attributed to the relatively homogenous characteristics of the study sample that does reduce the ability to detect meaningful differences across subgroups.

There are a number of limitations in the current study that need to be considered while analyzing its findings. To begin with, this study was performed at a single site, thereby limiting its applicability to the larger community. This particular study had 218 participants, a decent number but nevertheless too small for making a meaningful comparison between various demographic groups. Also, diagnosis of H. pylori infection was made using a single test method only. Use of multiple tests such as rapid urease test, histology, and serology would have provided more precise results.

CONCLUSION

The current study demonstrates that H. pylori infection is quite common in the group of patients suffering from gastroduodenal ulcer perforation, thus highlighting the crucial involvement of H. pylori in the etiology of such a life-threatening surgical disorder. Moreover, the current study highlights that male gender and lower socio-economic status are the main demographic features of the study subjects, which is consistent with the established epidemiology of H. pylori infections in developing nations.

Disclaimer: Not any

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