Association of Helicobacter pylori Infection in Intestinal and Diffuse Types of Gastric Adenocarcinoma

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ABSTRACT

Introduction: Gastric cancer is the fifth most common malignancy and the fourth leading cause of cancer-related death worldwide. Helicobacter pylori is a Group 1 carcinogen strongly associated with gastric malignancies. Gastric adenocarcinomas are classified into intestinal and diffuse types, which exhibit distinct biological characteristics. Studies on H. pylori prevalence across histological types have yielded conflicting results. **Objectives:** To determine the association of H. pylori infection in intestinal and diffuse types of gastric adenocarcinoma. **Methods & Materials:** This cross-sectional study was conducted in the Department of Pathology, Sylhet MAG Osmani Medical College, Bangladesh, from July 2011 to June 2012. Fifty patients with histologically confirmed gastric adenocarcinoma (intestinal or diffuse type) were enrolled. H. pylori infection was diagnosed using rapid urease test, histology with Giemsa stain, and serological ELISA, with infection confirmed if two of three methods were positive. **Results:** Patient age ranged from 25-80 years (mean 56.8±13.5 years). Males predominated (76.0%) with male:female ratio of 3.2:1. Intestinal-type comprised 68.0% and diffuse-type 32.0% of cases. Mean age was significantly lower in diffuse-type (50.4±5.1 years) than in intestinal-type (59.6±15.2 years; $p<0.05$). Males predominated in intestinal-type (91.2%), while females predominated in diffuse-type (56.2%; $p<0.01$). Overall, H. pylori positivity was 80.0%. Infection was present in 76.5% of intestinal-type and 87.5% of diffuse-type, with no statistically significant difference ($p>0.05$). **Conclusions:** H. pylori infection is highly prevalent in both intestinal and diffuse types of gastric adenocarcinoma in Bangladesh. Despite demographic differences between types, no significant difference in H. pylori infection rates was observed, suggesting its important role in the pathogenesis of both subtypes.

Keywords: *Helicobacter pylori; Gastric adenocarcinoma; Intestinal type; Diffuse type; Bangladesh*

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INTRODUCTION

Gastric cancer remains a significant global health burden, with an estimated 968,350 new cases and 659,853 deaths reported in 2022 [1]. In the United States, approximately 30,300 new cases and 10,780 deaths were estimated in 2025 [1]. Gastric cancer ranks as the fifth most common malignancy and fourth leading cause of cancer-related mortality worldwide[2]. Incidence varies geographically, with the highest rates in Eastern Asia, Eastern Europe, and South America, while lower rates occur in North America, Northern Europe, and South Asia.[3] In Bangladesh, H. pylori infection was detected in 36.19% of dyspeptic patients in a recent tertiary care hospital study, highlighting its persistent relevance in the region.[4] Helicobacter pylori is a Gram-negative, spiral-shaped bacterium that colonizes the gastric mucosa beneath the mucous layer. It produces urease, which hydrolyzes urea to ammonia, neutralizing gastric acid and facilitating survival.[5] Additional virulence factors, including cytotoxins (CagA and VacA), catalase, and phospholipase, contribute to epithelial damage and immune modulation.[6,7] The World Health Organization International Agency for Research on Cancer classified H. pylori as a Group 1 carcinogen due to its strong association with gastric malignancies[8]. However, while H. pylori infect more than 40% of the global population; the individual lifetime risk of developing gastric cancer in infected individuals is approximately 1-2%, suggesting additional cofactors are involved[6]. Gastric adenocarcinomas are divided into intestinal-type and diffuse-type according to Lauren's classification, with intestinal-type accounting for approximately 50% and diffuse-type approximately 30% of cases.[2] Intestinal-type carcinomas typically arise through a multistep process involving chronic gastritis, gastric atrophy, and intestinal metaplasia following H. pylori infection. Diffuse-type carcinomas are also associated with H. pylori infection but lack precursor lesions and frequently involve E-cadherin (CDH1) mutations.[2] Recent evidence suggests that diffuse-type cancer occurs in mucosa with marked inflammation at a relatively early stage of H. pylori infection, while intestinal-type cancer develops at a relatively late stage, paralleling the progression of mucosal atrophy and intestinal metaplasia[9]. These histological types exhibit distinct biological and clinical characteristics. Diffuse-type gastric cancer presents in younger patients, shows higher female predominance, and demonstrates greater metastatic potential with infiltrative growth patterns, including linitis plastica[2]. Prognosis differs significantly, with five-year cancer-related survival of 42.0% for diffuse-type compared to 49.5% for intestinal-type tumors[10]. Combined molecular and histological classification reveals even

greater stratification, with five-year survival of 31.5% for CIN-diffuse tumors versus 61.4% for GS-intestinal tumors[10]. Recent molecular studies have identified differential microRNA expression patterns, with miR-141-3p, miR-200b-3p, and miR-133a-5p significantly downregulated in diffuse-type compared to intestinal-type gastric cancer tissues, and low miR-141-3p expression correlates with significantly worse overall and disease-free survival.[11] Studies examining H. pylori prevalence across histological types have yielded conflicting results. Traditional risk factors differ between subtypes: H. pylori infection is associated with a far greater risk of developing intestinal-type than diffuse-type gastric cancer.[2,12] Smoking and obesity are associated with increased risk of intestinal-type but not diffuse-type cancer.[2] However, infection and associated inflammatory changes occur in all cases regardless of histological type, with immunological mechanisms playing a role in both subtypes.[9] Genetic studies demonstrate that mutations in cancer-related genes, including TP53 are more common in intestinal-type gastric cancer, suggesting host genetic factors may modify susceptibility to H. pylori-associated carcinogenesis.[10,13] First-degree relatives of gastric cancer patients show increased risk of H. pylori infection and precancerous conditions regardless of symptoms, supporting the importance of genetic predisposition.[14] Due to these conflicting findings regarding differential H. pylori association between histological types, we designed this study to examine differences in H. pylori infection between intestinal and diffuse types of gastric adenocarcinoma in our population.

OBJECTIVES

General objective:

- To find out the association of *Helicobacter pylori* infection in intestinal and diffuse types of gastric adenocarcinoma

Specific objective:

- To assess the presence of *H. pylori* infection in biopsy specimens by the CLO test
- To find out the histological patterns of gastric adenocarcinoma by H&E stain
- To detect *Helicobacter pylori* bacteria in the biopsy tissue by Giemsa stain
- To determine *anti-H. pylori antibody* in the serum of study subjects by the ELISA method

To compare the association of *H. pylori* infection between intestinal and diffuse types of gastric adenocarcinoma

METHODS & MATERIALS

This cross-sectional study was conducted in the Department of Pathology at Sylhet MAG Osmani Medical College, Sylhet, over a one-year period from July 2011 to June 2012. The study population comprised patients attending the Department of Gastroenterology at Sylhet MAG Osmani Medical College Hospital for upper gastrointestinal endoscopy, and the sample included those who met the selection criteria. Inclusion criteria comprised all patients with endoscopic findings suggestive of gastric carcinoma subsequently confirmed histologically as intestinal or diffuse-type gastric adenocarcinoma, irrespective of age and sex. Exclusion criteria included patients who refused enrollment, those who were severely ill, those with failed endoscopy procedures, those with mixed-type gastric adenocarcinoma, those with active gastrointestinal bleeding, and those with a history of Helicobacter pylori eradication therapy within two weeks before the study. Sample size was calculated using a gastric carcinoma prevalence of 2.4%[15], with 5% significance level and 5% margin of error, employing Frucher and Guilford's formula ($n = Z^2pq/d^2$), yielding an estimated sample size of 36. A total of 50 patients with gastric adenocarcinoma were ultimately enrolled using consecutive, convenient sampling according to the inclusion and exclusion criteria. Data were collected using a semi-structured, predesigned questionnaire prepared by the investigator. Written informed consent was obtained from all patients after a detailed explanation of the study purpose, and the Institutional Ethical Committee of Sylhet MAG Osmani Medical College approved the protocol. Clinical histories were recorded, and each patient underwent thorough examination, with all findings documented in the preformed data collection sheet. Patients with clinical features suggestive of gastric carcinoma were selected for upper GI endoscopy and instructed to fast for at least 8 hours. During endoscopy, multiple images were captured, all equipment was sterilized between procedures, and 4-6 biopsy samples were obtained from suspected lesions for histopathology. In contrast, 4 biopsies (2 from the antrum, 2 from the body) were obtained from normal-appearing areas for H. pylori detection. H. pylori infection was diagnosed using three methods: rapid urease test (RUT), histology, and serological ELISA, with infection confirmed if two of three methods were positive. For RUT, biopsy samples were placed within minutes into medium containing urea and phenol red indicator dye; the presence of Helicobacter pylori produced ammonia through enzymatic urease activity, increasing pH and causing a color change. For histology, gastric biopsy samples were fixed in 10% buffered formalin, embedded in paraffin, sectioned at 4 µm thickness, and stained with Hematoxylin & Eosin for histological examination and modified Giemsa staining for H. pylori identification.

Only patients with histologically proven intestinal or diffuse-type gastric adenocarcinoma were enrolled. For serology, 5 mL of blood was collected at endoscopy, serum was separated immediately and preserved at -20°C until analysis, and circulating IgG antibodies to Helicobacter pylori were detected by enzyme-linked immunosorbent assay (ELISA). Primary variables included histopathological types of gastric adenocarcinoma (intestinal type and diffuse type) and H. pylori infection status. Secondary variables comprised age, sex, smoking status, site of carcinoma, and morphologic type of gastric carcinoma. All data were recorded systematically, with quantitative data expressed as mean and standard deviation, and comparisons between groups performed by the Z-test, while qualitative data were expressed as frequency and percentages with comparison by the chi-square (χ^2) test. Statistical analyses were performed using SPSS for Windows version 26.0, with probability values (p) <0.05 considered statistically significant.

RESULTS

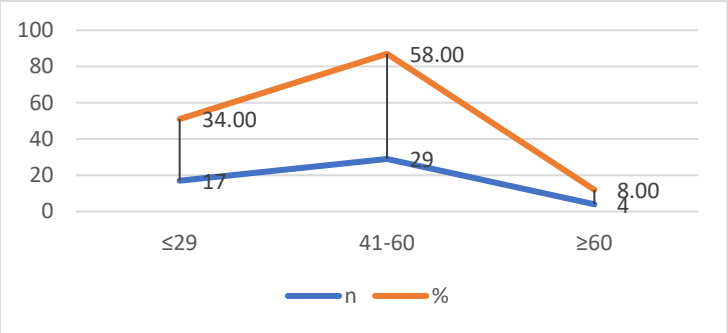

Figure 1 Distribution of patients by age (*n*=50)

This was a cross-sectional study conducted in the Department of Pathology, Sylhet MAG Osmani Medical College, Sylhet, Bangladesh, during the period from July 2011 to June 2012 with a view to finding out the association of *Helicobacter pylori* infection in intestinal and diffuse types of gastric adenocarcinoma. For this purpose, 50 patients with gastric adenocarcinoma were enrolled (*Figure 1*).

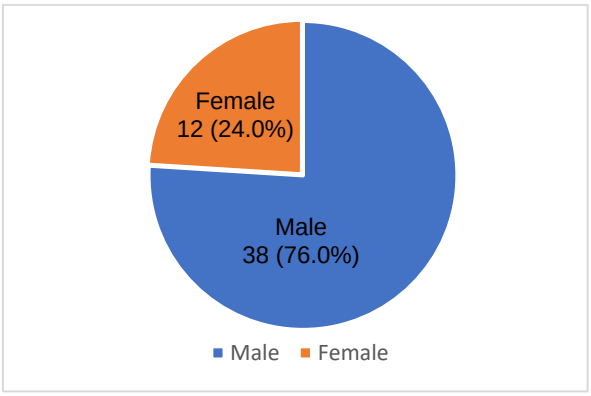

Figure 2 Distribution of the patients according to sex (*n*=50)

Figure 2 shows the distribution of sex of the patients. There were 38 males (76.0%) and 12 females (24.0%), indicating male predominance of gastric carcinoma with a ratio of male to female 3.2:1.

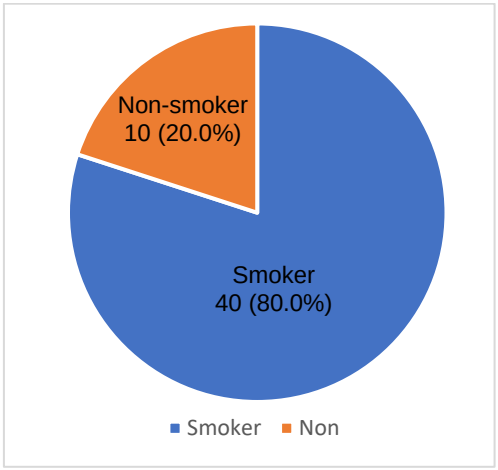

Figure 3 Distribution of the patients according to smoking status (*n*=50)

Distribution of the patients according to smoking status was shown in *Figure 3*. In this series 40 (80.0%) cases were smoker and 10 (20.0%) cases were non-smoker.

Table I shows the distribution of the site of involvement in gastric carcinoma. A single site was involved in 28 cases: antrum (with pylorus) was involved in 19 (38.0%); body was involved in 5 (10.0%); and fundus was involved in 4 (8.0%) cases. More than one site is involved in 22 cases. Among them, the antrum and body were involved in 12 (24.0%) cases; the body and fundus were involved in 6 (12.0%) cases; and the whole stomach (antrum, body, and fundus) was involved in 4 (8.0%) cases of the gastric carcinoma.

Table I
Distribution of site of involvement in gastric carcinoma (*n*=50)

Site of involvement	Frequency	Percentage
Antrum (with pylorus)	19	38
Body	5	10
Fundus	4	8
Antrum and Body	12	24
Body and Fundus	6	12
Antrum, Body and Fundus	4	8

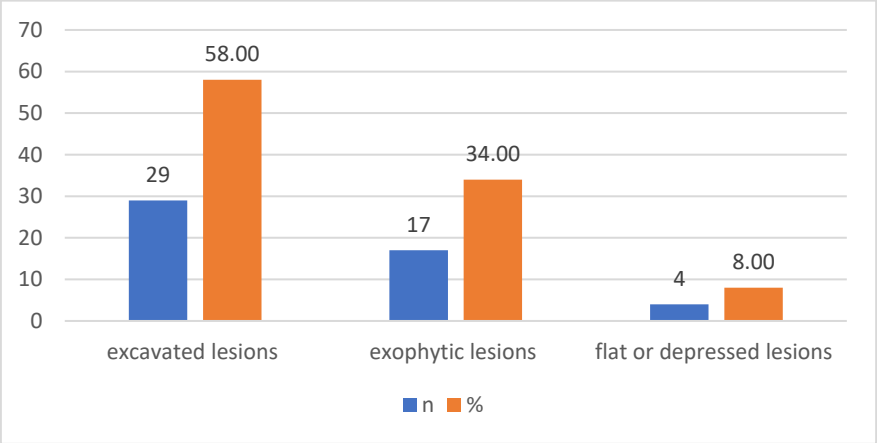

Figure 4 Distribution of morphological types of lesions of gastric carcinoma on endoscopy (*n*=50)

Figure 4 shows the distribution of morphological types of lesions of gastric carcinoma on endoscopy. There were excavated lesions in 29 (58.0%) cases, exophytic lesions in 17 (34.0%), and flat or depressed lesions in 4 (8.0%) cases.

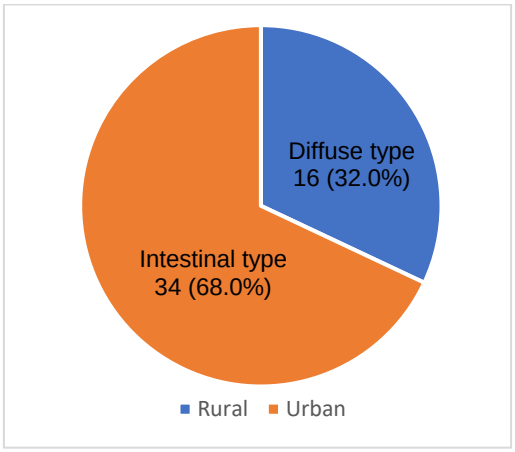

Figure 5 Distribution of histopathological sub-types of gastric carcinoma (*n*=50)

Figure 5 shows the distribution of histopathological types of gastric carcinoma. Most of the histopathological subtypes of gastric adenocarcinoma were the intestinal type [34 (68.0%)], and the remaining 16 (32.0%) were the diffuse type.

Table II shows the distribution of histologic types of gastric cancer by age and sex. The mean age in the intestinal type was 59.6±15.2 years, and in the diffuse type was 50.4±5.1 years. Diffuse-type carcinoma was predominant in younger age groups compared with that of intestinal type, and the age difference was statistically significant (Z=2.321; p<0.05). Males were predominant (91.2%) over females (8.3%) in intestinal-type cancer, and in the case of diffuse types, females (56.2%) were more predominant than male (43.8%) patients. The sex difference was statistically significant (χ^2=13.417, p<0.01).

Table II
Distribution of histologic types of gastric cancer by age and sex.

Variables		Gastric adenocarcinoma		p value
		Intestinal types (n=34)	Diffuse types (n=16)	
Mean age		59.6 ±15.2	50.4±5.1	*p<0.05
Sex	Male	31 (91.2)	7 (43.8)	†p<0.01
	Female	3 (8.3)	9 (56.2)	

Table III shows the association of *Helicobacter pylori* infection in intestinal and diffuse types of gastric adenocarcinoma. *Helicobacter pylori* infection was present in 26 (76.5%) of 34 cases in intestinal type, and in 14 (87.5%) of 16 cases in diffuse types of gastric adenocarcinoma. Though the prevalence of *Helicobacter pylori* infection was higher in the diffuse type than in the intestinal type, the difference is not statistically significant (χ^2=0.827; p>0.05).

Table-III
Association of *Helicobacter pylori* infection in intestinal and diffuse types of gastric adenocarcinoma.

Helicobacter pylori	Gastric adenocarcinoma		*p-value
	Intestinal type (n=34)	Diffuse type (n=16)	
Present	26 (76.5)	14 (87.5)	p>0.05
Absent	8 (23.5)	2 (12.5)	
Total	34 (100.0)	16 (100.0)	

DISCUSSION

Previous studies have established a strong relationship between Helicobacter pylori infection and gastric cancer, with recent meta-analyses confirming that H. pylori infection increases gastric cancer risk approximately 2.68-fold (95% CI: 1.85-3.89) [16]. The World Health Organization International Agency for Research on Cancer continues to classify H. pylori as a Group 1 carcinogen, with eradication therapy demonstrating a significant reduction in gastric cancer incidence (RR: 0.61; 95% CI: 0.47-0.79) [17]. Although H. pylori infection plays a pathogenic role in gastric carcinogenesis, clinical, histologic, and demographic differences have been noted in relating H. pylori to intestinal and diffuse types of gastric cancer [18]. In developing intestinal-type gastric cancer, H. pylori infection has been considered to play an important role through the Correa cascade of chronic gastritis, atrophy, and intestinal metaplasia [16,17]. Recent evidence suggests that diffuse-type gastric cancer occurs in the mucosa with marked inflammation at a relatively early stage of H. pylori infection, while intestinal-type cancer develops at a relatively late stage, paralleling the progression of mucosal atrophy and intestinal metaplasia [9]. Gene involvement studies in gastric carcinogenesis indicate H. pylori infection as a common starting point for different pathways leading to both histologic types [9,18].

This cross-sectional study was conducted in the Department of Pathology, Sylhet MAG Osmani Medical College, Bangladesh, from July 2011 to June 2012 to determine the association of Helicobacter pylori infection in intestinal and diffuse types of gastric adenocarcinoma. Fifty patients with gastric adenocarcinoma were enrolled and analyzed according to study objectives.

In this study, patient age ranged from 25 to 80 years with a mean age of 56.8±13.5 years. This finding aligns with Mahamud et al. (2021), who studied 112 gastric carcinoma patients in Bangladesh and reported a mean age of 57.23 years, with 54.46% of cases in the 50–60 year age group [19]. Similarly, Das et al. (2014) found a median age of 57 years among 150 gastric carcinoma patients in northeastern Bangladesh, with peak incidence in the 61-70 years age group [18]. Another Bangladeshi study by Kabir et al. (2011) reported a mean age of 51.05±14.98 years among 50 gastric carcinoma patients [20].

The present series showed 29 patients (58.0%) aged 41-60 years, 17 patients (34.0%) aged >60 years, and 4 patients (8.0%) aged ≤40 years. This approximates Mahamud et al. (2021) reporting 54.46% in the 50-60 year age group, followed by 31.25% in the 61-70 year age group [19]. Das et al. (2014) found that 33.33% of patients were below 50 years and 66.66% were above 50 years [18]. Recent evidence suggests increasing early-onset gastric cancer incidence, particularly for luminal gastrointestinal cancers, including stomach cancer, following a U-shaped birth cohort trend with rising rates in cohorts born after 1950 [21].

The current study included 38 males (76.0%) and 12 females (24.0%), indicating male predominance with a male-to-female ratio of 3.2:1. This aligns with Mahamud et al. (2021) reporting 72.32% males and 27.68% females with a male-to-female ratio of 2.61:1 among Bangladeshi gastric cancer patients [19]. Das et al. (2014) found a male-to-female ratio of 2.3:1 in their study of 150 patients [18]. Kabir et al. (2011) reported 64% males and 36% females among 50 gastric carcinoma patients[20]. A multicenter analysis comparing H. pylori -infected versus H. pylori-naïve gastric neoplasms found that H. pylori-naïve cancers occurred in younger patients (59.5 vs. 71.8 years, p<0.05) and more frequently in females (40.0% vs. 26.5%, p<0.05)[9]. Sex is considered an independent risk factor for gastric carcinoma, with the global consistency of male predominance suggesting biological differences between sexes rather than environmental factors alone.

In this series, 40 cases (80.0%) were smokers and 10 (20.0%) were non-smokers. Mahamud et al. (2021) found that 71.43% of gastric cancer patients were smokers and 28.57% were non-smokers in their Bangladeshi study[19]. The chance of gastric carcinoma was more than 2.75-fold higher in smokers (OR=2.778; 95% CI=1.123-6.868; p=0.025). Recent Bangladeshi data indicate that 46% of all cancers are tobacco-related, with 75.8% of male cancer patients being smokers and 40.5% consuming smokeless tobacco [3].

In the present study, single-site involvement occurred in 28 cases: antrum (with pylorus) in 19 (38.0%), body in 5 (10.0%), and fundus in 4 (8.0%). Multiple site involvement occurred in 22 cases: antrum and body in 12 (24.0%), body and fundus in 6 (12.0%), and whole stomach in 4 (10.0%). This aligns with Rahman et al. (2016) who studied 40 gastric carcinoma patients at the same institution (Sylhet MAG Osmani Medical College) and found antrum and pylorus involved in 37.5%, body and antrum in 25.0%, body and fundus in 15.0%, body alone in 10.0%, fundus alone in 5.0%, and whole stomach in 10.0% of cases [22]. Mahamud et al. (2021) reported antral region involvement in 58.03% of cases, body involvement in 25%, and cardiac end involvement in 16.97% [19]. Kabir et al. (2011) found that 50% of cancers were located in the antrum, followed by the antrum and body (24%), body (18%), fundus and body (4%), and fundus (4%) [20]. Recent evidence suggests that H. pylori-naïve gastric neoplasms are found more frequently in the proximal compartment (p<0.05) and have a smaller size (median 4.0 vs. 20.0 mm, p<0.05) compared to H. pylori-infected neoplasms [9]. There is evidence that tumors located in the gastric cardia and antrum may have different etiologies, and anatomic subsite should be considered in etiologic studies [9,18].

In this study, intestinal-type gastric adenocarcinoma predominated [34 cases (68.0%)] with diffuse-type in 16 cases (32.0%). This agrees with Kabir et al. (2011) reporting 52% intestinal type, 28% diffuse type, and 20% poorly differentiated adenocarcinoma among Bangladeshi

patients [20]. The higher proportion of intestinal type in the current study may reflect regional variations. Recent large cohort studies confirm that intestinal-type gastric cancer remains more common, with nomogram prediction models demonstrating area under the curve values of 0.82 for intestinal type compared to 0.62 for diffuse type, indicating better predictive capability for intestinal-type gastric cancer [18].

Mean age for intestinal type was 59.6 (SD 15.2) years and for diffuse type was 50.4 (SD 5.1) years, with diffuse-type carcinoma predominant in younger patients ($p<0.05$). Males predominated in the intestinal type and females in the diffuse type ($p<0.01$). Recent multicenter analysis confirms that diffuse-type gastric cancer presents in younger patients, shows higher female predominance, and demonstrates greater metastatic potential with infiltrative growth patterns [9].

In the current study, H. pylori were positive in 80.0% of gastric adenocarcinoma patients. This aligns with Kabir et al. (2011) reporting 60% overall prevalence of H. pylori in gastric carcinoma patients, with 88% in intestinal type, 57% in diffuse type, and 50% in poorly differentiated type[20]. Rahman et al. (2016) at the same institution found that all 40 gastric carcinoma patients were seropositive for H. pylori by ELISA, with 57.5% positive by rapid urease test and 67.5% positive by histology (Giemsa stain)[22]. Recent Bangladeshi data from Mymensingh Medical College detected H. pylori in 36.19% of dyspeptic patients, with gastritis (65%) being the most common endoscopic finding, followed by duodenal ulcer (15%), gastric ulcer (8.8%), and suspected gastric cancer (1.3%) [19]. The higher prevalence in gastric cancer patients compared to dyspeptic patients underscores the strong association between H. pylori and gastric malignancy.

Helicobacter pylori infection was present in 26/34 (76.5%) intestinal type and 14/16 (87.5%) diffuse type gastric adenocarcinoma. Although prevalence was higher in the diffuse type, the difference was not statistically significant ($p>0.05$). This finding is supported by Kabir et al. (2011), who found H. pylori prevalence of 88% in intestinal type versus 57% in diffuse type, though this difference was not statistically significant in their analysis[20]. Rahman et al. (2016) found that all gastric carcinoma patients were H. pylori seropositive, but CagA status did not differ significantly between cases and controls (92.5% vs. 87.5%; OR=1.762; $p=0.456$) [22]. Recent evidence from a Japanese multicenter study comparing H. pylori-infected versus H. pylori-naïve gastric neoplasms found that both groups primarily consisted of differentiated type (90.5% vs. 82.1%, $p=0.089$), with H. pylori-naïve neoplasms showing lower prevalence of invasive cancer (11.1% vs. 37.6%, $p<0.05$) and lymphovascular invasion (1.6% vs. 31.6%, $p<0.05$) [9]. Recent meta-analyses confirm that H. pylori infection is associated with both histological types, with no significant differential association demonstrated in contemporary studies [16,17].

LIMITATIONS

Our study has several limitations. It was a cross-sectional, single-center analysis with a limited sample size. Only endoscopic biopsy samples were studied rather than resected specimens, which were very small in amount, creating possibilities for sampling error and diagnostic underestimation. When different histological types co-exist in the disease process, small samples may not be representative, and one type may be missed. A prospective multicenter study with a larger sample size and evaluation of resected specimens is necessary to confirm these results.

CONCLUSION

This study demonstrates that Helicobacter pylori infection is highly prevalent (80.0%) in Bangladeshi patients with gastric adenocarcinoma, with no statistically significant difference between intestinal-type (76.5%) and diffuse-type (87.5%) gastric cancer ($p>0.05$). Despite significant demographic variations—diffuse-type presenting at a younger age (50.4 vs. 59.6 years; $p<0.05$) with female predominance, while intestinal-type showed male predominance (91.2%; $p<0.01$)—the similar infection rates suggest that H. pylori plays an important pathogenic role in both histological subtypes. The high prevalence of smoking (80.0%) highlights the importance of environmental cofactors in gastric carcinogenesis. Early detection and eradication of H. pylori infection may help reduce the gastric cancer burden in Bangladesh. Larger multicenter studies are recommended for further elucidation.

REFERENCES

1. Patel AK, Sethi NS, Park H. Gastric cancer: a review. JAMA. 2026;335(1):45-52.
2. Pectasides E, Selim JH, Bass AJ, et al. Diffuse gastric cancer: a comprehensive review of molecular features and emerging therapeutics. Drugs. 2024;84(11):1389-1412.
3. Thrift AP, El-Serag HB. Burden of gastric cancer. Clin Gastroenterol Hepatol. 2020;18(3):534-542.
4. Ferdaus SJ, Haque N, Karim MR, et al. Detection of Helicobacter pylori in gastroduodenal biopsy samples of dyspeptic patients by rapid urease test and polymerase chain reaction in a tertiary care hospital of Bangladesh. Mymensingh Med J. 2025;34(2):365-374.
5. Malfertheiner P, Camargo MC, El-Omar E, et al. *Helicobacter pylori* infection. Nat Rev Dis Primers. 2023;9(1):19.
6. Zhang CY, Yuan ZJ, Chen Z, et al. The impact of multidimensional interactions among Helicobacter pylori infection, tumor microenvironment, and gut microbiota on gastric cancer immune response. Eur J Pharmacol. 2025;178401. Online ahead of print.
7. Raza Y, Mubarak M, Memon MY, Alsulaimi MS. Update on molecular pathogenesis of Helicobacter pylori-induced gastric cancer. World J Gastrointest Pathophysiol. 2025;16(2):107052.
8. International Agency for Research on Cancer. *Helicobacter pylori*. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol 100B. Lyon: IARC; 2012:385-435.
9. Kikuchi S. The relationship between Helicobacter pylori infection and gastric cancer histological types. Nippon Rinsho. 2024;82(12):1-6.
10. van der Kaaij RT, van Essen HF, van der Post RS, et al. Chromosomal copy number based stratification of gastric cancer has added prognostic value to Lauren's histological classification. BJC Rep. 2024;2(1):58.
11. Zhang Z, Dong Y, Hua Y, et al. Differentially expressed microRNA in prognosis of gastric cancer with Lauren classification. Cancer Biomark. 2024;41(1):41-54.
12. Parsonnet J, Vandersteen D, Goates J, Sibley RK, Pritikin J, Chang Y. Helicobacter pylori infection in intestinal- and diffuse-type gastric adenocarcinomas. J Natl Cancer Inst. 1991;83(9):640-643.
13. González CA, Figueiredo C, Lic CB, et al. *Helicobacter pylori* infection and risk of gastric cancer according to histological subtype. Int J Cancer. 2022;150(4):612-620.
14. Ligato I, Dilaghi E, Cozza G, et al. Endoscopic and histological assessment in first-degree relatives of gastric cancer patients undergoing gastroscopy: a cross-sectional study. Eur J Gastroenterol Hepatol. 2025;37(4):421-426.
15. Hu PJ, Li YY, Mitchell HM, et al. Seroprevalence of Helicobacter pylori infection in patients with gastric carcinoma in southern China. J Gastroenterol Hepatol. 1995;10(Suppl 1):S35-S37.
16. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249.
17. International Agency for Research on Cancer. Helicobacter pylori. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol 100B. Lyon: IARC; 2012:385-435.
18. Das A, Saha M, Chandra Shil B, Yasmin R, Banik G, Umme Salam M, Minnat B. Clinical Profile of Patients Presenting with Carcinoma Stomach in North-East District of Bangladesh. J Med. 2014;15(2):118-121.

19. Mahamud M, Islam MS, Wahed F, Karim A. Trend of Carcinoma of the Stomach in Relation to Site, Age and Aetiology: Study of 112 Cases in a Tertiary Level Hospital. Mymensingh Med J. 2021;30(2):395-401.
20. Kabir MA, Barua R, Masud H, Ahmed DS, Islam MMSU, Karim E, Sarker MN, Barman RC. Clinical Presentation, Histological Findings and Prevalence of Helicobacter pylori in Patients of Gastric Carcinoma. Faridpur Med Coll J. 2011;6(2):78-81.
21. Pectasides E, Selim JH, Bass AJ, et al. Diffuse gastric cancer: a comprehensive review of molecular features and emerging therapeutics. Drugs. 2024;84(11):1389-1412.
22. Rahman MK, Patwary MI, Rahman MH. Association of CagA+ Helicobacter pylori infection and gastric carcinoma. BSMMU J. 2016;9(2):89-94.