

Association of Helicobacter Pylori with Gastric Pathologies in a Tertiary Care Hospital, Quetta

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ABSTRACT

Objective: To determine the relationship between H. Pylori with histopathological changes in gastric pathologies.

Study design: Cross-sectional analytical study

Place and Duration of Study: Combined Military Hospital, Quetta, Pakistan, from Jan 22 to Sep 24.

Methodology: A total of 150 patients were included in this study. Adult patients (≥ 13 years) with complete clinical, endoscopic, and histopathological data were included. Data were analyzed using SPSS version 20.

Results: A total of 150 patients were included in the study, with 44 (29.3%) cases testing positive for H. pylori. The majority of cases comprised inflammatory conditions (92%, n=138), with Chronic non-specific gastritis being most common, followed by H. pylori-associated gastritis (24.7%, n=37). These conditions were significantly higher in males as compared to females. Tumours were observed in 8.0% (n=12) of patients, with adenocarcinoma in 9 cases. There was a significant correlation of H. pylori infection with histological changes ($p < 0.001$) and the development of adenocarcinoma.

Conclusion: Our study revealed a significant association between H. pylori infection and severity of activity, gastric inflammation, glandular atrophy, intestinal metaplasia, and subsequent development of Adenocarcinoma. These findings highlight the critical role of H. pylori in gastric pathophysiology and emphasize the importance of H. pylori testing in patients with chronic gastritis and precancerous lesions.

Keywords: Adenocarcinoma, Gastric Cancer, Gastritis, Helicobacter Pylori

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INTRODUCTION

Gastritis is an inflammation of the stomach's mucosal lining. Globally, gastritis affects 50.8% of the population in developing countries, with a lower prevalence of 34.7% in developed countries¹. Gastritis can be classified as acute or chronic, based on symptom duration. Gastric cancer (GC) ranks as the fifth most common cancer worldwide and is the third leading cause of cancer-related deaths, with some regional disparities in incidence rates. The highest rates are found in East Asia, South America, and Russia. Men are affected more than women, and around 75% of all cases and deaths occur in Asia.² Although the incidence of GC is lower in the United States, approximately 27,000 new diagnoses occur annually.³ According to a meta-analysis, the overall prevalence of gastric cancers in Pakistan is around 6%, with 6541 deaths per year.⁴

Approximately 95% of all stomach cancers are classified as adenocarcinomas. Several risk factors have been identified, including H. Pylori infection,

smoking, excessive alcohol consumption, high salt intake, smoked foods, and exposure to ionizing radiation. Additionally, being male, over the age of 50, and having a low socioeconomic status also increases the risk of developing stomach cancer.^{5,6} Helicobacter pylori (H. pylori) infection is the most prevalent globally, frequently resulting in chronic gastritis, peptic ulcer disease, and gastric cancer.⁷ Clinically, H. pylori is classified as a Group 1 carcinogen by the World Health Organization and is recognized as the leading cause of gastric cancer worldwide. Its association with various histopathological changes, such as chronic non-specific inflammation, glandular atrophy, and intestinal metaplasia, highlights the necessity for a thorough understanding of its role in disease progression.⁸

Accurate diagnosis and effective management of gastrointestinal disorders depend significantly on clinical evaluation, endoscopic findings, and histopathological examination. Gastric biopsy not only helps distinguish between malignant and non-malignant conditions but also offers vital insights into underlying pathologies, including chronic gastritis, intestinal metaplasia, and gastric adenocarcinoma.⁹ The prognosis for advanced gastric cancer is generally

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poor; however, early detection of gastric cancer can significantly improve survival rates, reaching as high as 90%.¹⁰

Understanding the correlation of *H. pylori* with specific histopathological features can enhance diagnostic accuracy and patient management. The primary objective is to determine the relationship with histopathological changes in gastric pathologies. Through this retrospective analysis, we aim to provide valuable insights into the diagnostic patterns and histopathological characteristics of gastrointestinal disorders, ultimately guiding future diagnostic and therapeutic strategies.

METHODOLOGY

This cross-sectional analytical study was conducted at Combined Military Hospital Quetta, Pakistan, focusing on patients who underwent gastric biopsies between Jan 22 and Sep 24. Ethical approval was obtained from the Institutional Review Board (CMH QTA-IERB/48/2024).

Inclusion Criteria: The study population included adults of both genders aged 18 years and older who presented with various gastrointestinal symptoms such as dyspepsia, epigastric pain, anaemia, or gastrointestinal bleeding. Patients with complete clinical, endoscopic, and histopathological data were included.

Exclusion Criteria: Patients with incomplete biopsy data or inadequate tissue samples for histological evaluation were excluded. Excision specimens or poorly fixed specimens were also excluded.

A sample size of 150 was calculated using the WHO sample size calculator, with a 95% confidence interval, anticipated population of 73.3%, and 11 and 7% absolute precision. Biopsies were reported using the updated Sydney system for gastric biopsies¹². Data were collected from hospital electronic records and histopathology archives. Variables included patient demographics (age, gender), clinical symptoms, endoscopic findings, and histopathological results. Biopsy specimens were obtained via endoscopy, and diagnoses were classified as Inflammatory conditions and tumors. Inflammatory conditions included chronic non-specific gastritis (CNSG), *Helicobacter pylori*-associated pangastritis, *H. pylori*-associated chronic antral gastritis, peptic ulcers, and atrophic gastritis. Tumors included benign tumors like hyperplastic polyps and malignant tumors like gastric adenocarcinoma and gastrointestinal stromal tumors.

H. pylori presence was confirmed using Giemsa staining. Informed consent was obtained, and data confidentiality was maintained.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 20. The Fisher exact test was used to determine the association of *H. pylori* infection with age, gender, symptoms and adenocarcinoma and to find gender correlation with benign and malignant conditions in gastric biopsies. Patients were divided into five age groups: I (< 20 years), II (21–30 years), III (31–40 years), IV (41–50 years), and V (> 50 years). Results were statistically significant if the *p*-value was less than or equal to 0.05.

RESULTS

The patients' ages in the study ranged from 13 to 75 years, with a mean age of 40.05 years $\pm$ 14.45. The age distribution predominantly comprised participants between 21 and 50 years. Males constituted the majority, representing 65.3% (n=98) of the sample, while females accounted for 34.7% (n=52).

Among the 150 participants, the most frequently reported symptom was epigastric pain, observed in 66 patients (44.0%), followed by dyspepsia in 48 patients (32%). Dysphagia was present in 9 patients (6%), and anemia in 15 patients (10%), as shown in Figure.

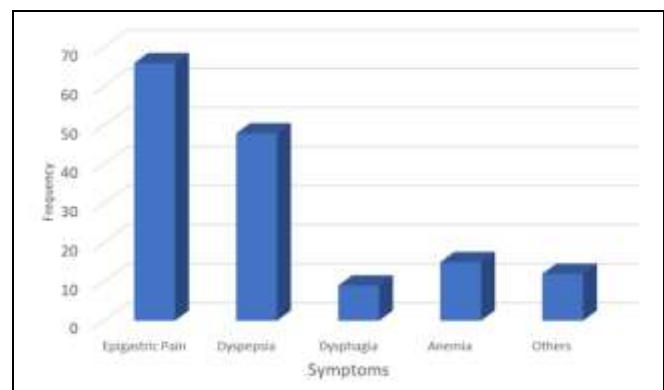


Figure: Frequency of symptoms among the patients (n=150)

Of the 150 participants, the vast majority were diagnosed with inflammatory conditions, comprising 138 cases (92%). Neoplasms were identified in 12 patients (8.0%). The most prevalent inflammatory condition was Chronic nonspecific gastritis (CNSG), occurring in 99 patients (66.0%). This was followed by *H. pylori*-associated chronic antral gastritis in 26 patients (17.3%) and *H. pylori*-associated pangastritis in 11 patients (7.3%). Atrophic gastritis, a less common finding, was observed in 2 patients (1.3%). These lesions were found to be higher in males as compared

to females and were found to be statistically significant.

The sole benign tumor identified was a hyperplastic polyp, found in 1 patient (0.7%). Malignant tumors accounted for a small yet significant portion of the diagnoses, with 11 cases (7.3%) in total. Adenocarcinoma was the most frequently identified malignancy, present in 9 patients (6.0%). Additionally, rarer malignancies included a single case each of a gastrointestinal (GI) stromal tumor (0.7%) and a neuroendocrine tumor (0.7%). These findings are summarized in Table-I.

The analysis among the 150 patients (n=150) revealed that 44 patients (29.3%) tested positive for H. pylori, while the majority, 106 patients (70.7%), were negative. On evaluating these cases for histological changes, 48.7% (n=73) of biopsies showed no signs of activity. Mild activity was observed in 24.7% (n=37), while moderate activity was seen in 18% (n=27), and severe activity in 8.7% (n=13).

Regarding inflammation, 4% (n=6) exhibited no signs of inflammation, 50.7% (n=76) demonstrated mild inflammation, 28.7% (n=43) presented moderate inflammation, and 16.7% (n=25) manifested severe

Table-I: Inflammatory And Neoplastic Conditions In Gastric Biopsies (N=150)

Histological Diagnosis	Gender		Total	p-value
	Male	Female		
Inflammatory Conditions				
CNSG	65 (65.6%)	34 (34.4%)	99 (66%)	0.015
H. pylori-associated pangastritis	8 (72.7%)	3 (27.3%)	11 (7.3%)	
H. pylori-associated chronic antral gastritis	19 (73.1%)	7 (26.9%)	26 (17.3%)	
Atrophic gastritis	1 (50%)	1 (50%)	2 (1.3%)	
Total	93 (67.4%)	45 (32.6%)	138 (92%)	
Neoplasms				
Hyperplastic polyp	0	1 (100.0%)	1 (0.7%)	0.594
Gastrointestinal Stromal Tumor	1 (100.0%)	0	1 (0.7%)	
Neuroendocrine tumor	0	1 (100.0%)	1 (0.7%)	
Adenocarcinoma	0	2 (100.0%)	2 (1.3%)	
Well differentiated	2 (66.7%)	1 (33.3%)	3 (2)	
Moderately differentiated	2 (50.0%)	2 (50.0%)	4 (2.6%)	
Poorly differentiated				
Total	5 (41.7%)	7 (58.3%)	12 (8.0%)	

*CNSG-Chronic Non-Specific Gastritis, H. Pylori – Helicobacter Pylori

Table-II: Association of H. Pylori with Histological Changes in Gastric Biopsies

Variable		H. Pylori			p-value
		Negative	Positive	Total	
Activity	Not Seen	73 (100.0%)	0	73 (48.7%)	<0.001
	Mild	30 (81.1%)	7 (18.9%)	37 (24.7%)	
	Moderate	3 (11.1%)	24 (88.9%)	27 (18.0%)	
	Severe	0	13 (100.0%)	13 (8.7%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	
Inflammation	Not Seen	6 (100.0%)	0	6 (4.0%)	<0.001
	Mild	76 (100.0%)	0	76 (50.7%)	
	Moderate	24 (57.1%)	18 (40.9%)	42 (28.0%)	
	Severe	0	26 (100.0%)	26 (17.3%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	
Glandular Atrophy	Not Seen	87 (86.1%)	14 (13.9%)	101 (67.3%)	<0.001
	Mild	16 (36.4%)	28 (63.6%)	44 (29.3%)	
	Moderate	2 (50.0%)	2 (50.0%)	4 (2.7%)	
	Severe	1 (100.0%)	0	1 (0.7%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	
Intestinal Metaplasia	Not Seen	102 (76.7%)	31 (23.3%)	133 (88.7%)	<0.001
	Mild	4 (28.6%)	10 (71.4%)	14 (9.3%)	
	Moderate	0	3 (100.0%)	3 (2.0%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	

inflammation. The antrum of the stomach was predominantly affected, with 86.0% (n=129) of biopsies exhibiting inflammation in this region. The majority of the gastric biopsies (93.3%, n=140) showed no inflammation in the corporal region, while only 6.7% (n=10) exhibited inflammation.

Concerning glandular atrophy, 67.3% (n=101) presented no atrophy, 30% (n=45) demonstrated mild atrophy, 2% (n=3) exhibited moderate atrophy, and 0.7% (n=1) manifested severe atrophy. Regarding intestinal metaplasia, 87.3% (n=131) showed no metaplasia, while 9.3% (n=14) exhibited mild metaplasia and 2% (n=3) demonstrated moderate metaplasia. This distribution indicates that intestinal metaplasia was relatively uncommon, with the majority of cases showing no metaplastic changes (Table-II).

The distribution of H. pylori positivity across age groups did not demonstrate a statistically significant association ($p=0.77$). No significant association was observed between H. pylori status and gender ($p=0.562$). The relationship between H. pylori status and reported symptoms was also not statistically significant ($p=0.056$). Symptoms such as epigastric pain, dyspepsia, and dysphagia were prevalent in both H. pylori-positive and negative cases, with epigastric pain being the most common symptom (Table-III).

There was a significant association between H.

with a higher risk of adenocarcinoma development (Table-III).

Moderate to severe activity was observed in H. pylori-positive cases compared to mild to moderate activity in H. pylori-negative cases, showing a significant association between H. pylori status and activity level ($p<0.001$). In the H. pylori-negative group, mild inflammation was observed in 100% (n=76) cases and moderate inflammation in 57.1% (n=24) of cases. The H. pylori-positive group exhibited moderate (n=18) to severe inflammation (n=26), with $p<0.001$ indicating a significant association between H. pylori status and inflammation severity. In the H. pylori-positive group, glandular atrophy was not observed in 13.9% (n=14) cases, mild in 63.6% (n=28) cases, and moderate in 50% (n=2) cases, statistically significant with $p<0.001$. In H. pylori-positive cases, mild intestinal metaplasia was observed in 71.4% (n=10) of 14 cases and moderate metaplasia in 3 cases. In H. pylori-negative cases, only 28.6% (n=4) showed mild intestinal metaplasia, also statistically significant ($p<0.001$). (Table-II).

DISCUSSION

Our study aimed to investigate the association between H. pylori infection and various clinical and histopathological factors, including tumor type, histopathological findings, intestinal metaplasia, age group, and sex. Our primary findings indicate a significant association between H. pylori infection and

Table-III: Association of H. pylori with Age and Gender, Symptoms and Gastric Cancer

Variable		H. Pylori			p-value
		Negative	Positive	Total	
Age groups	≤20 Years	3 (75.0%)	1 (25.0%)	4 (2.7%)	0.277
	21-30 Years	33 (75.0%)	11 (25.0%)	44 (29.3%)	
	31-40 Years	28 (77.8%)	8 (22.2%)	36 (24.0%)	
	41-50 Years	17 (56.7%)	13 (43.3%)	30 (20.0%)	
	>50 Years	25 (69.4%)	11 (30.6%)	36 (24.0%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	
Gender	Male	68 (69.4%)	30 (30.6%)	98 (65.3%)	0.563
	Female	38 (73.1%)	14 (26.9%)	52 (34.7%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	
Symptoms	Epigastric Pain	52 (78.8%)	14 (21.2%)	66 (44.0%)	0.056
	Dyspepsia	33 (68.7%)	15 (31.3%)	48 (32.0%)	
	Dysphagia	2 (22.2%)	7 (77.8%)	9 (6.0%)	
	Anemia	11 (73.3%)	4 (26.7%)	15 (10.0%)	
	Other	8 (66.7%)	4 (33.3%)	12 (8.0%)	
	Total	106 (70.7%)	44 (29.3%)	150 (100.0%)	
Adenocarcinoma		2 (22.2%)	7 (77.8%)	9 (6.0%)	0.001

*H. Pylori – Helicobacter Pylori

pylori positivity and the presence of adenocarcinoma ($p=0.001$). Among the patients with adenocarcinoma, 7 out of 9 cases (77.8%) were H. pylori-positive. This finding suggests that H. pylori infection is associated

histological changes such as activity, severity of inflammation, glandular atrophy, intestinal metaplasia, and adenocarcinoma. There was no significant association between gender and H. pylori, but inflammatory gastric conditions were significantly

higher in males in our study. No significant association was found between *H. pylori* and different age groups.

Gastric diseases, with varying incidences and prevalence across regions, remain a significant global health concern.¹² Chronic gastritis is strongly associated with *Helicobacter pylori* infection. *H. pylori* is recognized as the primary etiological factor of chronic gastritis worldwide, with a prevalence exceeding 50% globally.⁴ Despite its high prevalence, only a small percentage of infected individuals develop gastric cancer, suggesting that other factors such as gut microbiota, dietary habits, and host genetics also influence disease outcomes, as reported by Filho *et al.*¹³ Zubair *et al.*, highlighted that in Pakistan and South Asia, gastric cancer ranks among the top five most common cancers, with incidence rates higher than the global average.¹⁰

Our findings were consistent with those of a large-scale study by Yang *et al.*, involving 1303 patients that found significant associations between *H. pylori* virulence and gastric lesions.¹⁴ Another meta-analysis of 97 studies conducted by El-Khadir *et al.*, revealed that *H. pylori*-positive children had significantly higher risks of gastric antral and corpus chronic inflammation, neutrophil infiltration, lymphoid follicles, and rare gastric mucosal atrophy compared to *H. pylori*-negative children.¹⁵ This is consistent with our findings. A multicentred cross-sectional study by Kalach *et al.*, found that high altitude, diet, and age were significantly correlated with gastric disease severity, while *H. pylori* infection and sex did not show significant correlations.¹⁶ Diet and age were identified as risk factors for intestinal metaplasia, with a meat-rich diet at high altitudes associated with a higher incidence of metaplasia. These findings underscore the complex relationship between *H. pylori* infection and gastric histological changes, emphasizing the need to consider multiple factors in assessing gastric disease risk and progression.¹⁷

Interestingly, contradictory findings have been reported regarding the correlation between *H. pylori* infection and gender. While some studies, like Inoue *et al.*, found no significant difference in infection rates between males and females,¹⁸ others reported a slightly higher prevalence in men compared to women. Durak *et al.*, reported that the male sex was significantly associated with *Helicobacter pylori* infection, which contrasts with our study, where no

significant association was found between sex and *H. pylori* infection. Additionally, it was found that there was no difference in *H. pylori* infection positivity and intestinal metaplasia, which contradicts our findings, where a significant correlation was observed between *H. pylori* infection and the presence of intestinal metaplasia.¹⁹ Miranda *et al.*, found no association between sex and *Helicobacter pylori* infection or gastric cancer, suggesting that sex may not be a significant factor in the development of these conditions.²⁰ This discrepancy could be attributed to differences in the study populations, sample sizes, or geographical and environmental factors.

In our study, 77.8% (n=7) of adenocarcinomas were positive for *H. pylori*, which is consistent with findings reported by Zavros *et al.*²¹ Similarly, Li *et al.*, reported that *H. pylori* is a risk factor for adenocarcinoma, which aligns with our study.²² Kikuchi *et al.*, found no significant association between age and *Helicobacter pylori* infection, indicating that the prevalence of *H. pylori* may not vary significantly with age.²³ Similarly, we did not observe a significant association between age and *H. pylori* infection. This concordance in findings suggests that, in both studies, age may not be a key factor influencing *H. pylori* prevalence.

The lack of association could be due to the wide age range in the study populations and the complex nature of *H. pylori* transmission, which may not be solely influenced by age, but rather by other factors such as socioeconomic status or hygiene practices. The absence of association with age groups and sex also suggests that *H. pylori* infection is not influenced by these demographic factors, which is consistent with other studies that have found no significant sex difference in the prevalence of *H. pylori* infection. Further studies with larger sample sizes and longitudinal designs are necessary to better elucidate the interactions between *H. pylori* infection, demographic characteristics, and gastric pathologies.

LIMITATION OF STUDY

The generalizability of results in the regional population could not be established. The association also did not establish the causative factors. It is recommended that future studies be conducted at massive scale to establish the factors influencing gastric symptoms secondary to *Helicobacter pylori*.

CONCLUSION

The study found a significant association between *H. pylori* infection and specific histological findings, particularly severity of inflammation, activity, glandular

atrophy, intestinal metaplasia, and gastric adenocarcinoma. However, no significant associations were observed between H. pylori and age, gender, and specific symptoms. Further studies with larger sample sizes and longitudinal designs are needed to better understand the complex interactions between H. pylori, demographic factors, and other gastric diseases.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MZ & FM: Data acquisition, data analysis, critical review, approval of the final version to be published.

SND & JA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

NKA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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