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GASTRIC PATHOLOGIES AND HELICOBACTER PYLORI: A CORRELATIVE STUDY.

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ABSTRACT

BACKGROUND: Given that *H. pylori* have a well-established function in gastric pathology, little is known about the relationship between *H. pylori* infection, histological findings, and demographic characteristics including age and gender. **OBJECTIVE:** To assess the degree of *H. pylori* infection and how it relates to histopathological alterations. **METHODS:** This retrospective observational study was carried out at Khyber Teaching Hospital, Peshawar, from January to June 2024. A sample of 150 patients was selected based on a 99% confidence interval and 5% margin of error. Adult patients (≥18 years) with complete clinical, endoscopic, and histopathological data were included. Data were analyzed using SPSS version 26, with chi-square tests was applied to assess associations. **RESULTS:** Among total (n=150) patients, with 44 (29.3%) testing positive for *H. pylori*. Majority were diagnosed with inflammatory conditions (90.7%, n=136) with Chronic non-specific gastritis most common. Malignant tumors were observed in 8.0% (n=12) patients, with adenocarcinoma in 9 cases. There was a significant correlation between *H. pylori* infection and gastric adenocarcinoma (p=0.001). No significant associations were found between *H. pylori* infection and age groups (p=0.298), or gender (p=0.637). **CONCLUSION:** There is no correlation between *H. pylori* infection and age or gender, however there is a substantial correlation between *H. pylori* infection and stomach cancer. These results underline the significance of *H. pylori* testing in patients with precancerous lesions and chronic gastritis, as well as the crucial role that *H. pylori* plays in stomach pathophysiology.

KEYWORDS: Gastric Cancer, Adenocarcinoma, *H. pylori*, Stomach, Biopsy, Histopathology.

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INTRODUCTION

Globally, stomach cancer is a major health concern, ranking among the top five most prevalent cancers and being a leading cause of cancer-related mortality, with incidence rates varying considerably across different geographic regions. The highest rates are found in East Asia, South America, and Russia [1,2]. In 2020, GC was the fourth cancer with the highest mortality rates for both men and women. Men are

affected at rates approximately twice that of women, and around 75% of all cases and deaths occur in Asia [3,4]. Although the incidence of GC is lower in the United States, approximately 27,000 new diagnoses occur annually [5]. Globally, an estimated 1,089,103 new stomach cancer cases were reported in 2020, with Mongolia, Japan, and the Republic of Korea exhibiting the highest incidence rates. Concerning mortality, 768,793 deaths were recorded for the same year, with the highest rates occurring in Mongolia, Tajikistan, and China [4].

Approximately 95% of all stomach cancers are classified as adenocarcinomas, which can be cardia tumors and distal (non-cardia) tumors. The majority of stomach cancers are found in the distal regions and are primarily linked to chronic *Helicobacter pylori* infection. In contrast, cardia cancers are more closely associated with gastroesophageal reflux disease and obesity [6]. In addition, males and persons over the age of 50 or 60 years are also under advanced risk of rising stomach cancer reflecting higher incidence among populations of lower socioeconomic status [6-8]. *H. pylori* are well documented as an etiologic factor in chronic gastritis, peptic ulcers, and gastric cancer [9]. *H. pylori* are selected by the World Health Organization as a Group 1 carcinogen and recognized as the prevalent etiologic agent of gastric cancer in the world [10]. *H. pylori* infection varies in occurrence based on geography, and higher levels are noticed particularly in developing countries, reaching from 20%-80% in different populations [11]. Association of this bacterium to several histopathological changes including chronic non-specific gastritis, glandular atrophy and intestinal metaplasia emphasizes the imperative for extensive understanding about the role of *H. pylori* in disease causation [12].

Particular diagnosis and effective treatment of gastrointestinal (GI) diseases are highly dependent on the combination of clinical examination, endoscopic findings, and histopathological investigation [13]. Biopsies from the stomach in particular and intestines play a superior role in the confirmation of examines in cases presented by symptoms like dyspepsia, epigastric pain, or GI bleed. These models play an important role in distinguishing among benign and malignant progressions as well as causal disease such as chronic gastritis, intestinal metaplasia, and gastric adenocarcinoma [14]. Advanced gastric cancer still has a bleak outlook and the five-year survival is about 20%. Diagnosis in the earlier stages on the other hand yields greatly improved results, the survival being as high as 90% 15. Intestinal metaplasia (IM) and chronic atrophic gastritis (CAG) are well-defined precursor lesions for gastric adenocarcinoma (GC) [14].

Histopathological examination including gastric biopsies plays an essential role in the differentiation of malignancies and benign processes, thereby facilitating key clinical findings. Nevertheless, of technical improvements in diagnostic modalities correlation among clinical symptoms such as endoscopic remarks and histopathological appearances is still insufficient. The present retrospective study is considered to highlight analytical patterns and histopathological outlines of GI disorders to permit more precise diagnostics and treatment planning in clinical practice.

METHODS

This retrospective clinical study was conducted in Khyber Teaching Hospital, Peshawar, among patients who experienced gastric and intestinal biopsies from January till June 2024. A sample size of about 150 was calculated using OpenEpi, with 99% confidence interval, 5% margin, and hypothesized stomach cancer prevalence as 6%, based on population size of 2,481,000 [15]. Adults who were above the age of 18 and testified having gastrointestinal symptoms like dyspepsia, epigastric pain, anemia,

gastrointestinal bleed, were included in the study population. Only patients having complete clinical, endoscopic, and histopathological records were included in the study. Patients having incomplete biopsies and inadequate tissue samples for histological examination were not included.

Data was collected including medical records and histopathology department records. The variables collected included patient demographics (age, gender), clinical symptoms, endoscopic findings, and histopathological results. Biopsy specimens were obtained via endoscopy, and histopathological diagnoses were classified as inflammatory conditions and Tumors. Inflammatory conditions included conditions such as chronic non-specific gastritis (CNSG), *Helicobacter pylori*-associated pangastritis, peptic ulcers and atrophic gastritis, while Tumors included benign and malignant tumors. Malignant tumors included gastrointestinal stromal tumors, gastric adenocarcinoma, and others, while benign tumors included hyperplastic polyps. Giemsa staining was used to found the presence of *H. pylori.*

Data was analyzed using SPSS version 26. Descriptive statistics were employed to summarize patient demographics, clinical characteristics, and biopsy results. Chi-square tests were used to analyze the relationship between clinical symptoms, endoscopic findings, and histopathological outcomes. Statistical significance was set at a p-value of less than 0.05.

RESULTS

The age of participants in the study ranged from 13 to 75 years, with a mean age of 40.77 years ±14.72. When examining the age groups, the majority of participants fell into the 21–30 years age group, making up 28% of the sample (n = 42). This was followed by 35 participants (23.3%) in the 31–40-year group, 31 participants (20.7%) aged 41–50 years, and 38 participants (25.3%) who were older than 51 years. The smallest group was participants under 20 years, comprising only 2.7% (n = 4). Overall, the age distribution reflects a predominance of participants between 21 and 50 years, with fewer younger and older individuals. In terms of gender distribution, males were the majority, representing 65.3% (n = 98) of the sample, while females accounted for 34.7% (n = 52) (table 1).

TABLE 1 DISTRIBUTION OF PARTICIPANTS BY AGE AND GENDER WITH PERCENTAGE AND FREQUENCY

Variable	Category	Percentage & Frequency
Age	<20 Years	2.7% (n=4)
	21–30 Years	28.0% (n=42)
	31–40 Years	23.3% (n=35)
	41–50 Years	20.7% (n=31)
	>51 Years	25.3% (n=38)
Gender	Male	65.3% (n=98)
	Female	34.7% (n=52)

Among the 150 participants, the most frequently reported symptom was epigastric pain, reported by 69 patients (46.0%), and followed by dyspepsia in 47 patients (31.3%). Dysphagia was observed in 8 patients (5.3%), and anemia in 14 patients (9.3%). Less frequent symptoms included ulceration, noted in 2 patients (1.3%), and bleeding in 5 patients (3.3%). Weight loss was present in 3 patients (2.0%), and hematemesis was reported by 2 patients (1.3%) (table 2).

Among the 150 participants, the vast majority were diagnosed with

inflammatory conditions, comprising 136 cases (90.7%). Malignant diagnoses were identified in 12 patients (8.0%), while benign conditions were seen in only 2 patients (1.3%).

TABLE 2 DISTRIBUTION OF SYMPTOMS BY FREQUENCY AND PERCENTAGE.

Symptom	Frequency (n)	Percentage (%)
Epigastric Pain	69	46.0
Dyspepsia	47	31.3
Dysphagia	8	5.3
Anemia	14	9.3
GI Bleeding	5	3.3
Weightloss	3	2.0
Ulcer	2	1.3
Hematemesis	2	1.3

The most common inflammatory condition was Chronic nonspecific gastritis (CNSG) was the most common, occurring in 99 patients (66.0%). This was followed by *Helicobacter pylori*-associated conditions: pangastritis in 11 patients (7.3%) and chronic gastritis in 26 patients (17.3%). Atrophic gastritis, a less common finding, was seen in 2 patients (1.3%) (table 3).

TABLE 3 FREQUENCY OF INFLAMMATORY CONDITIONS AMONG THE PARTICIPANTS

Condition	Frequency (n)	Percentage (%)
CNSG	99	66.0
H. Pylor associated pangastritis	11	7.3
H. Pylor associated chronic gastritis	26	17.3
Atrophic Gastritis	2	1.3

The sole benign tumor identified was a hyperplastic polyp, found in just 1 patient (0.7%). Malignant tumors accounted for a small yet significant portion of the diagnoses, with 12 cases (8.0%) 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%) (Table 4).

TABLE 4 TYPE OF TUMORS DIAGNOSED AMONG THE PARTICIPANTS

Tumor Type	Frequency (n)	Percentage (%)
Adenocarcinoma	9	6.0
GI stromal tumor	1	0.7
Neuroendocrine Tumor	1	0.7
Hyperplastic Polyps	1	0.7

The *Helicobacter pylori* (*H. pylori*) 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. In terms of gastric activity, 50.0 % (n = 75) of biopsies showed no signs of activity. A mild activity was observed in 40.0% (n = 60), while moderate activity was seen in 8.0% (n = 12) and severe activity in only 2.0% (n = 3).

Inflammation was prevalent in the majority of the samples. Mild inflammation was observed in 44.0% (n = 66), moderate inflammation in 34.0% (n = 51), and severe inflammation in 5.3% (n = 8). Only 16.7% (n = 25) of the biopsies showed no inflammation. The antrum of the stomach was predominantly affected, with 86.0% (n = 129) of biopsies showing inflammation in the antrum. In contrast, 14.0% (n = 21) of participants had a

negative result for the antrum. 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.

Glandular atrophy was not seen in 80.0% (n = 120) of biopsies, while 17.3% (n = 26) showed mild atrophy. Moderate atrophy was observed in 2.0% (n = 3) and severe atrophy in 0.7% (n = 1). Intestinal metaplasia was observed in only 9.3% (n = 14) of the biopsies. Of these, 6.7% (n = 10) showed mild metaplasia and 2.7% (n = 4) showed moderate metaplasia. The majority of participants (90.6%, n = 136) had no signs of intestinal metaplasia (Table 1).

TABLE 5: GRADE OF HISTOLOGICAL CHANGES IN GASTRIC BIOPSIES

Histological Changes	**Grade**				**Total**
	Not Seen	Mild	Moderate	Severe	
Inflammation	16.7% (25)	44% (66)	34% (51)	5.3% (8)	100% (150)
Activity	50% (75)	40% (60)	8.0% (12)	2% (3)	100% (150)
Glandular Atrophy	80% (120)	17.3% (26)	2% (3)	0.7% (1)	100% (150)
Intestinal Metaplasia	90.6% (136)	6.7% (10)	2.7% (4)	0% (0)	100% (150)

The crosstabs analysis examining the association between *H. pylori* status and various variables reveals several key findings. The distribution of *H. pylori* positivity across age groups did not show a statistically significant association (Pearson Chi-Square = 4.897, p = 0.298). While *H. pylori* positivity varied slightly, with the highest counts in younger age groups, this variation was not enough to indicate a significant relationship. A significant correlation was observed between *H. pylori* positivity and adenocarcinoma (Pearson Chi-Square = 10.840, p = 0.001) (Table 2).

TABLE 6: ASSOCIATION OF *H. PYLORI* WITH AGE AND GENDER OF THE PARTICIPANTS

Variable		***H. pylori***			
		Negative	Positive	Total	p-value
Age groups	≤20 Years	2	2	4	0.298
	21--30 Years	25	17	42	
	31--40 Years	27	8	35	
	41--50 Years	24	7	31	
	≥51 Years	28	10	38	
	Total	106	44	150	
Gender	Male	68	30	98	0.637
	Female	38	14	52	
	Total	106	44	150	
Symptoms	Epigastric Pain	47	22	69	0.739
	Dyspepsia	35	12	47	
	Dysphagia	7	1	8	
	Anemia	8	6	14	
	Other	9	3	12	
	Total	106	44	150	
Adenocarcinoma	Positive	104	37	141	0.001
	Negative	2	7	9	
	Total	106	44	150	

The Crosstabs analysis of *H. pylori* status with histological features, including activity, inflammation, glandular atrophy, and intestinal metaplasia, using Chi-square test yielded the following findings (Table 3).

TABLE 7: ASSOCIATION OF *H. PYLORI* WITH HISTOLOGICAL CHANGES IN GASTRIC BIOPSIES

Variable		*H. pylori* Negative	Positive	Total	p-value
Activity	Not Seen	51	23	74	0.690
	Mild	43	17	60	
	Moderate	8	4	12	
	Severe	3	0	3	
	Total	105	44	149	
Inflammation	Not Seen	18	7	25	0.915
	Mild	48	18	66	
	Moderate	35	16	51	
	Severe	5	3	8	
	Total	106	44	150	
Glandular Atrophy	Not Seen	81	39	120	0.326
	Mild	22	4	26	
	Moderate	2	1	3	
	Severe	1	0	1	
	Total	106	44	150	
Intestinal Metaplasia	Not Seen	95	41	136	0.426
	Mild	7	3	10	
	Moderate	4	0	4	
	Total	106	44	150	

DISCUSSION

This study investigated the relationship between *H. pylori* infection and several clinical and histopathological factors, including tumor type, histopathological features, intestinal metaplasia, age, and gender. Our main findings indicate a significant association between *H. pylori* infection and certain gastrointestinal conditions, such as *H. pylori*-induced Pangastritis and Chronic Active Gastritis, as well as the presence of intestinal metaplasia.

In contrast to the 29.3% prevalence found in our study, Kosekli et al. reported an *overall H. pylori* infection prevalence of 71% in their investigation[16].The difference in Helicobacter pylori prevalence between our study and that of Kosekli et al. likely stems from differences in study design and population. While Kosekli et al. included a broader range of patients with numerous gastrointestinal conditions, our study was limited to those who underwent gastric biopsies. Moreover, compared to the 60% prevalence described by Tiwari et al. in gastric biopsy samples, our study detected a particularly lower prevalence of 29.3% [17]. A strong correlation was found between *H. pylori* infection and the development of H. pylori-induced pangastritis and chronic active gastritis. All cases of these histopathological conditions were *H. pylori*-positive, and the Chi-square test confirmed this relationship with a highly significant p-value of < 0.001. Similarly, the analysis of intestinal metaplasia revealed no significant correlation with *H. pylori* infection ($p = 0.426$), with cases of no intestinal metaplasia being more frequently associated with *H. pylori*

positivity. Additionally, no significant associations were found between *H. pylori* infection and activity (p = 0.690), glandular atrophy (p = 0.326), or inflammation (p = 0.915) in the gastric biopsies.

A report by Durak *et al.*shows male more affected as compared to female, which contrasts with our study, where no significant association was found between gender and *H. pylori* (p = 0.145). Additionally, Durak *et al.* found that there was no difference in *H. pylori* infection positivity and intestinal metaplasia, which aligns with our findings, where no significant correlation was observed between *H. pylori* infection and the presence of intestinal metaplasia (p = 0.426) [18]. Miranda *et al.* found no association between gender and *Helicobacter pylori* infection or gastric cancer, suggesting that gender may not be a significant factor in the development of these conditions. Similarly, our study also found no significant association between gender and *H. pylori* infection (p = 0.637) [19]. Our study revealed a significant association between *H. pylori* infection and adenocarcinoma (p = 0.001), supporting findings reported by Zavros *et al.*[20]. Similarly, Li *et al.*, reporting *H. pylori* as a risk factor for adenocarcinoma which aligns with our study [21].

Agah et al. described a main relationship between female gender and *Helicobacter pylori* infection, representative susceptibility to *H. pylori*-related gastric diseases among females. Our study discovered their studies, no important gender vs. *H. pylori* infection correlation (p = 0.637). Differences in study populations, sample sizes, and environmental and regional factors might be the reason for this inconsistency [22]. Likewise, Kikuchi et al. revealed no significant correlation of age with *H. pylori* infection, indicating age is not likely to be a key factor in the prevalence of the infection. Our result is in agreement with theirs, since there was no significant correlation of age and *H. pylori* infection (p = 0.298) [23].

The absence of association with gender and age in our study suggests that these demographic factors could have slight effect on *H. pylori* prevalence, as stayed by other studies which have stated low gender-based differences in infection. In addition, the widespread age range between the participants from below 20 to above 51 years might not have allowed for discovery of any age specific trends. Alternatively other factors, including socioeconomic status, and hygiene activities might be more significant in terms of transmission *H. pylori.* To make clear how demographic factors relate with *H. pylori* infection, larger and more heterogenous groups, along with longitudinal study designs, are to be considered in future research.

CONCLUSION

Our study established a solid suggestion among *Helicobacter pylori* infection and specific gastrointestinal pathologies, such as *H. pylori*-induced pangastritis, chronic active gastritis, and adenocarcinoma. No significant associations were, however, seen among *H. pylori* and intestinal metaplasia, gender, age, or other histological features. These observations propose demographic factors might not play a vital role in the prevalence of *H. pylori* infection among our population. More widespread inquiries using longitudinal methodologies and larger cohorts are required to unravel the complex relations among *H. pylori,* demographic factors, and gastric pathologies.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

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