

Frequency of *Helicobacter pylori* infection in patients with functional dyspepsia

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ABSTRACT

Objective: To determine the frequency of *Helicobacter pylori* infection in patients with functional dyspepsia at a tertiary care hospital in Pakistan.

Material and Methods: A descriptive cross-sectional survey was done in the Department of Medicine, Allama Iqbal Teaching Hospital, Dera Ghazi Khan, between January 9 and July 8, 2024. A total of 169 consecutive patients in the age group of 18–60 years fulfilling Rome III criteria for functional dyspepsia (symptom duration >6 months) were enrolled. Diagnostic upper endoscopy was carried out, with biopsy specimens taken from abnormal gastric lesions. The *Helicobacter pylori* infection was documented histopathologically on Gram stain and rapid urease testing, and culture was used for discordant reports. Infection was defined as positivity in ≥ 2 tests. Baseline demographics (age, gender, educational/ marital status) and symptom duration were recorded. Statistical analysis used SPSS v23, with chi-square tests for associations ($p \leq 0.05$ significant).

Results: *Helicobacter pylori* infection was detected in 86/169 patients (50.89%). Mean age was 40.11 (9.08) years; mean symptom duration was 13.24 (5.42) months. Gender distribution was that males comprised 90 (53.3%) and females 79 (46.7%). A significant association existed between male gender and *H. pylori* positivity ($p = 0.026$). No associations were found with age, educational status, or marital status ($p > 0.05$).

Conclusion: Half of functional dyspepsia patients (50.9%) were infected with *Helicobacter pylori*, underscoring the need for routine screening in this population in endemic regions.

Keywords: Cross-sectional studies, Dyspepsia, *Helicobacter pylori*, Pakistan, Prevalence.

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INTRODUCTION

Helicobacter pylori, a Gram-negative bacterium residing on the human intestinal mucosa, is one of the most common chronic infections globally, infecting about 50% of the world's population [1-3]. Beyond the asymptomatic carriage, its clinical impact includes peptic ulcer disease (gastric and duodenal ulcers), gastric adenocarcinoma, and mucosa-associated lymphoid tissue (MALT) lymphoma [4]. The

infection demonstrates marked geographical heterogeneity, with developing nations bearing the highest burden due to socioeconomic determinants including overcrowding, inadequate sanitation, contaminated water sources, and limited healthcare access [5]. In endemic regions, seroprevalence exceeds 80% by adulthood, with childhood acquisition establishing lifelong colonization without intervention [6].

Functional dyspepsia, well-defined by Rome III criteria as chronic or recurrent upper abdominal discomfort (postprandial ampleness, prompt satiety, epigastric aching/scorching) exclusive of structural disease, affects 10–40% of the population globally. While its pathophysiology remains multifactorial, encompassing visceral hypersensitivity, impaired gastric

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accommodation, and duodenal inflammation, the role of *H. pylori* remains contentious. Systematic reviews indicate modest symptomatic improvement post-eradication, yet population-level impact varies significantly across epidemiological settings.

Regional studies highlight stark disparities in *H. pylori* prevalence among dyspeptic cohorts: 31.2% in Iran [6], 75.6% in Afghanistan [7], 58.8% in India [8], and 50–51% in Pakistan's urban centers [9,10]. These variations reflect divergent environmental exposures, diagnostic methodologies, and healthcare infrastructure. Crucially, data from Pakistan's non-metropolitan regions, where 60% of the population resides with limited tertiary care access, remain sparse. Dera Ghazi Khan, a predominantly rural district in Punjab province characterized by low socioeconomic indicators, exemplifies such an understudied high-risk population.

This study intended to determine the frequency of *H. pylori* infection in functional dyspepsia patients at Allama Iqbal Teaching Hospital, Dera Ghazi Khan. By establishing region-specific prevalence and associations with demographic variables, we seek to inform cost-effective diagnostic algorithms in resource-constrained settings where endoscopic capacity is limited, and empirical eradication strategies require validation.

MATERIAL AND METHODS

This descriptive cross-sectional study was carried out at the Department of Medicine, Allama Iqbal Teaching Hospital, Dera Ghazi Khan, Pakistan, between January 9 and July 8, 2024. The protocol of the study was approved by the institutional review committee (IRC Approval No. 137/MED/DGKMC; Date: 02/01/2024), and written informed consent was taken from all the participants before enrollment. A sample size of 169 patients was calculated using the formula:

$$n = \frac{Z^2 \times P(100 - P)}{e^2}$$

where $Z=1.96$ (95% confidence interval), $P=31.2\%$ (expected prevalence based on prior regional data)⁶, and $e=7.0\%$ (margin of error).

Consecutive sampling was employed to recruit adults aged 18–60 years fulfilling Rome III criteria for functional dyspepsia: (1) postprandial fullness, (2) early satiation, or (3) epigastric pain/burning for >6 months. Exclusion criteria comprised recent use (within 2 weeks) of proton pump inhibitors (e.g., omeprazole) or antibiotics. Consecutive sampling recruited adults aged 18–60 years meeting Rome III criteria for functional dyspepsia, defined as chronic (>6 months) symptoms of postprandial fullness, early satiation, or epigastric pain/burning.

Exclusion criteria encompassed: 1) recent use (within 2 weeks) of proton pump inhibitors (e.g., omeprazole) or antibiotics; 2) prior *H. pylori* eradication therapy; and 3) alarm features suggestive of organic disease (e.g., unintentional weight loss >10% body weight, hematemesis, or dysphagia).

All participants underwent diagnostic upper endoscopy performed by consultant physicians (≥ 5 years post-fellowship experience). Biopsy specimens were obtained from macroscopic lesions in the antrum and corpus. *Helicobacter pylori* infection was confirmed via: Gram staining (visualization of curved bacilli), Rapid urease test (colorimetric change in urea medium), Culture (microaerobic incubation on selective agar for discordant results). Formal histopathological examination with Haematoxylin & Eosin (H&E) or special stains (e.g., Giemsa) was not performed as part of this diagnostic protocol. Infection was defined as positivity in ≥ 2 tests.

Culture for *H. pylori* infection was carried out in all 169 patients. Culture was performed on selective media using Skirrow's medium. Incubation conditions included temperature of 35–37°C, atmospheric conditions of 5% O₂, 10% CO₂ and 85% N₂, achieved by using gas-controlled incubators. Incubation time was 3 to 10 days. Culture turned out to be positive in 86 (50.9%) patients.

Demographic variables (age, gender, educational status, marital status) and symptom duration were recorded. Statistical analysis was conducted using SPSS v23.0 (IBM Corp.,

Armonk, NY). Continuous variables (age, symptom duration) were expressed as mean (standard deviation); categorical variables as frequencies/ percentages. Associations between *H. pylori* positivity and demographic factors were assessed using chi-square tests, with $p \leq 0.05$ considered statistically significant.

RESULTS

A total of 169 patients with functional dyspepsia were evaluated. The mean age was 40.11 ± 9.08 years, and the mean symptom duration was 13.24 ± 5.42 months. The baseline demographic and clinical characteristics of the

study participants are summarized in Table-I. The cohort comprised 90 males (53.25%) and 79 females (46.75%).

Helicobacter pylori infection was identified in 86 patients, yielding a prevalence of 50.89% (Figure-I). The analysis of associations between demographic variables and *H. pylori* status is presented in Table-II. A statistically significant association was observed between male gender and *H. pylori* positivity (58.9% vs. 41.8% in females; $p=0.026$) (Figure-II). No significant associations were found between *H. pylori* infection and age, educational status, or marital status ($p>0.05$).

Table I: Baseline characteristics of the study population (n=169).

Characteristic	Value
Age (Years)	
Mean (SD)	40.11 (9.08)
Range	18 - 60
Symptom Duration (Months)	
Mean (SD)	13.24 (5.42)
Range	4 - 30
Gender, n (%)	
Male	90 (53.25)
Female	79 (46.75)
Educational Status, n (%)	
Illiterate	52 (30.77)
Primary	75 (44.38)
Secondary	37 (21.89)
Higher Secondary +	5 (2.96)
Marital Status, n (%)	
Married	134 (79.29)
Unmarried	31 (18.34)
Divorced	4 (2.37)

Table II: Association of demographic variables with *H. pylori* positivity.

Variable	Category	<i>H. pylori</i> Positive	<i>H. pylori</i> Negative	p-value
Gender	Male	53	37	0.026
	Female	33	46	
Age Group (Years)	18-39	49	37	0.107
	40-60	37	46	
Educational Status	Illiterate	26	26	0.107
	Primary	40	35	
	Secondary	16	21	
	Higher Secondary +	4	1	
Marital Status	Married	71	63	0.107
	Unmarried	13	18	
	Divorced	2	2	

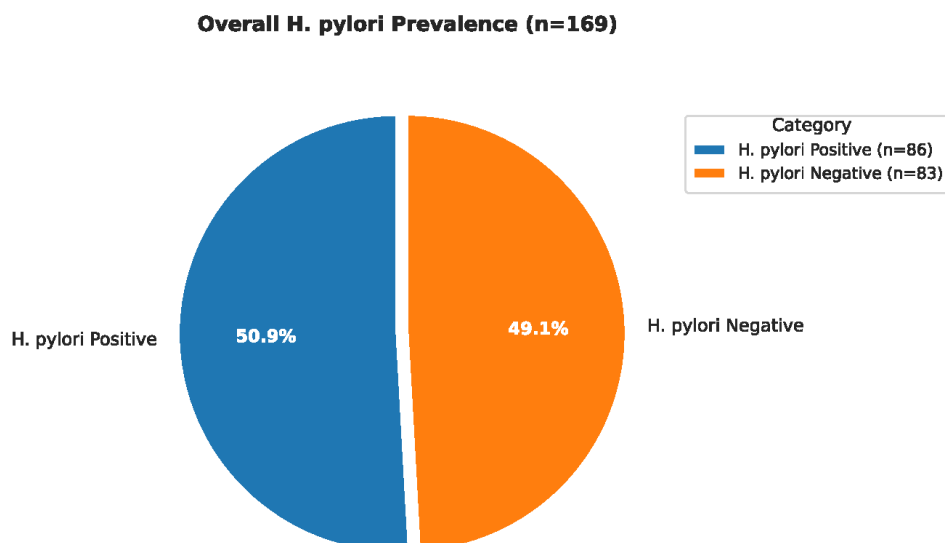


Figure-I: Pie chart showing the overall prevalence of *Helicobacter pylori* infection in the study cohort (50.89%).

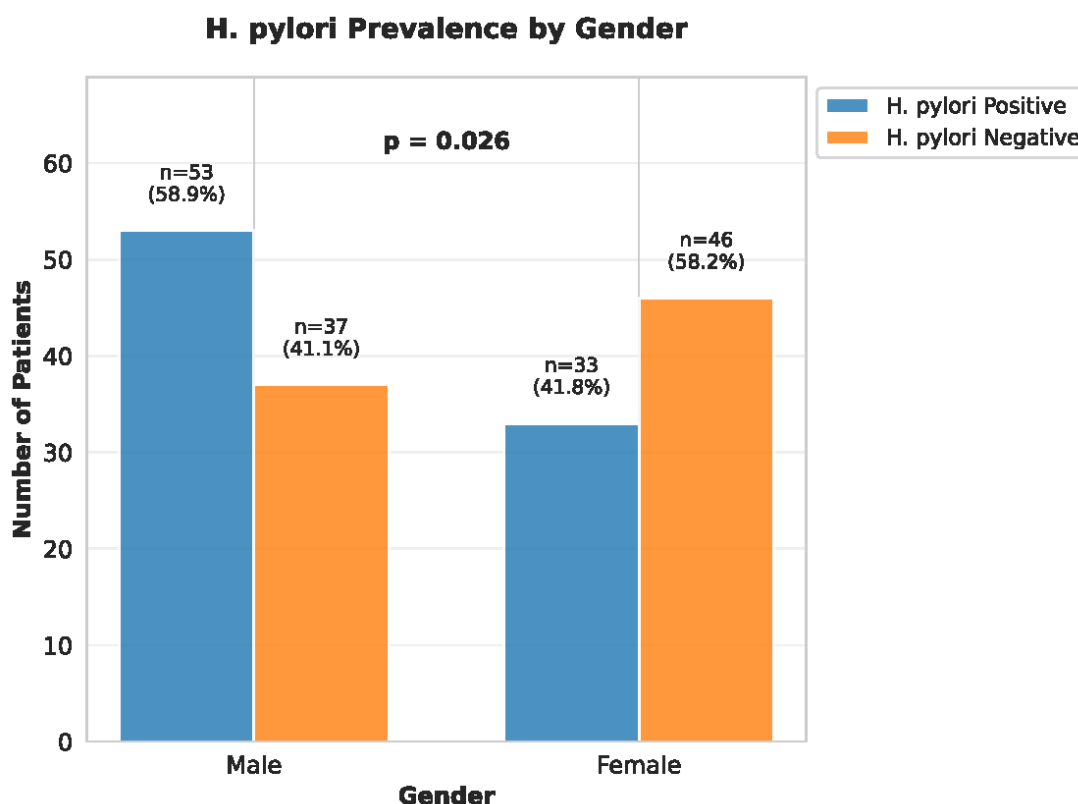


Figure-II: Bar chart showing the prevalence of *Helicobacter pylori* infection by gender. A significant association was observed between male gender and *H. pylori* positivity ($p=0.026$).

DISCUSSION

The present study identified *Helicobacter pylori* infection in 50.89% of functional dyspepsia patients at a tertiary hospital in rural Pakistan.

The high prevalence of *H. pylori* in our dyspeptic cohort is biologically plausible, as the infection is implicated in key pathophysiological mechanisms of functional dyspepsia. While not

all infected individuals develop symptoms, *H. pylori* can induce low-grade gastric and duodenal inflammation, characterized by increased mucosal permeability, duodenal eosinophilia, and mast cell activation [1,2]. These immune responses can sensitize visceral nerves, leading to the heightened perception of pain and discomfort characteristic of functional dyspepsia [3]. Furthermore, the infection has been associated with disturbances in gastroduodenal motility, including impaired gastric accommodation and delayed emptying, which directly contribute to postprandial fullness and early satiation [4]. Therefore, identifying and eradicating *H. pylori* in a significant portion of patients could potentially ameliorate these underlying inflammatory and motor dysfunctions, providing a rationale for the symptomatic improvement observed in some patients post-eradication therapy.

This prevalence aligns closely with prior Pakistani studies reporting 50–51% in urban centers [9,10], reinforcing *H. pylori* as a major etiological agent in dyspepsia nationwide [11–13]. The consistency across geographically distinct regions suggests pervasive endemicity driven by shared socioeconomic determinants, notably poverty, inadequate sanitation, and contaminated water supplies, documented as key transmission facilitators in developing economies [5]. Nevertheless, our findings contrast with significantly lower rates in Iran (31.2%) [6] and higher rates in Afghanistan (75.6%)⁷, highlighting how regional disparities in public health infrastructure modulate infection burden [15,16].

Our 50.9% prevalence aligns with Hussain *et al.* (2025) reporting 51.2% in Pakistani dyspeptics [13], but contrasts with Abdi *et al.* (2024) who found only 48.7% in Ethiopia despite similar endemicity¹¹. This divergence may reflect methodological differences: we used histopathology/urease testing versus their stool antigen testing. Notably, our male predominance (58.9% vs 41.8%; OR=1.97) mirrors Fernandez-Caso *et al.* (2020) who attributed gender disparities to occupational exposures in agrarian

communities [16], consistent with Dera Ghazi Khan's rural economy where males dominate farming activities with heightened soil/ water exposure.

A critical observation was the gender disparity in *H. pylori* frequency, with males exhibiting significantly higher positivity than females (58.9% vs. 41.8%; $p = 0.026$). This parallels gender skews observed in South Asian cohorts and may reflect occupational or behavioral factors [17], males in rural Pakistan often engage in agricultural or labor-intensive work with heightened exposure to contaminated soil and water, while cultural norms may delay healthcare-seeking until advanced infection. Conversely, the absence of associations with age, education, or marital status suggests that demographic variables beyond gender exert limited influence on infection risk in this population.

Clinically, the 50.9% prevalence underscores the necessity of routine *H. pylori* screening in functional dyspepsia patients across Pakistan, particularly where endoscopic resources are scarce. Our results support the "test-and-treat" strategy endorsed by Cochrane reviews for high-prevalence (>20%) regions [18,19], as empirical eradication could mitigate long-term complications (e.g., peptic ulcers, gastric cancer) while alleviating dyspeptic symptoms. This approach holds relevance in rural settings like Dera Ghazi Khan, where limited diagnostic capabilities necessitate cost-effective interventions.

Several limitations warrant acknowledgment. The single-center design restricts generalizability, and unexamined confounders, including dietary patterns, water sources, and *H. pylori* strain virulence, may influence transmission dynamics. Methodologically, reserving culture for discordant cases might have underestimated infection rates, as low bacterial loads evade conventional staining and urease testing [20]. Future multicenter studies should incorporate molecular diagnostics (e.g., PCR) and assess socioeconomic variables to identify targeted prevention strategies.

Prospective research should prioritize: 1) cost-effectiveness analyses comparing endoscopic screening versus empirical eradication in resource-constrained settings; 2) virulence genotyping (*cagA*, *vacA*) to stratify high-risk subgroups; and 3) longitudinal monitoring of symptom resolution post-eradication. Such evidence will optimize management algorithms for functional dyspepsia in *H. pylori*-endemic regions, where the infection remains a neglected yet modifiable determinant of gastrointestinal morbidity.

CONCLUSION

Half of functional dyspepsia patients in rural Pakistan harbor *H. pylori* infection, with males facing twice the risk of females. These findings endorse routine *H. pylori* screening in dyspepsia management protocols for endemic regions, particularly where gender-based occupational exposures heighten transmission.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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Declared none

AUTHORS CONTRIBUTION

Kashif Ali: Substantial contributions to study design, acquisition of data, manuscript drafting, reviewing it critical for important intellectual content, final approval, accountable for all aspects of publication.

Farid-ud-Din: Substantial contributions to acquisition of data, manuscript drafting, reviewing it critical for important intellectual content, final approval, accountable for all aspects of publication.

Mujahid Iqbal: Manuscript drafting, critical review, final approval, accountable for all aspects of publication.

Muhammad Aman Ullah: Substantial contributions to study design, critical review, final approval, accountable for all aspects of publication.

Hina Fatima: Acquisition of data, critical review, proofreading, final approval, accountable for all aspects of publication.

Muhammad Jawwad Ali: Critical review, proofreading, final approval, accountable for all aspects of publication.

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