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Original article

Persistent High Burden of *Helicobacter pylori* Infection and Early Gastric Precancerous Lesions: A Five-Year Retrospective Study (2021–2025) from Misurata Medical Center, Libya

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Abstract
Helicobacter pylori infection remains a major public health problem in low- and middle-income countries and is a well-established risk factor for gastric cancer. Contemporary longitudinal histopathological data from Libya are scarce. The objective of this study is to determine the five-year prevalence, evolving patterns, and histopathological consequences of H. pylori infection in central Libya and to compare these findings with regional and international epidemiologic data. A retrospective descriptive study was conducted on 201 gastric biopsy specimens diagnosed at the Department of Pathology, Misurata Medical Center, between January 2021 and December 2025. Histopathological evaluation was performed using hematoxylin and eosin staining, with modified Giemsa when indicated. Diagnoses were made according to the WHO Classification of Digestive System Tumours (5th edition). Demographic, endoscopic, and histological data were analyzed. Associations were assessed using chi-square testing. H. pylori infection was identified in 162 cases (80.6%). Intestinal metaplasia and epithelial dysplasia were detected in 4.5% and 1.0% of cases, respectively. A statistically significant increase in H. pylori prevalence was observed over time, rising from 57.1% in 2022 to 85.3% in 2025 ($p = 0.03$). Premalignant lesions were significantly more frequent in patients aged ≥60 years ($p = 0.01$). Nodular gastric mucosa showed a strong association with H. pylori positivity ($p < 0.001$). H. pylori infection remains highly prevalent in central Libya, with evidence of early precancerous changes. These findings highlight the urgent need for structured national eradication programs, standardized biopsy protocols, and risk-stratified surveillance to reduce future gastric cancer burden.
Keywords. *Helicobacter Pylori, Gastritis, Intestinal Metaplasia, Dysplasia, Libya.*

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Introduction

Helicobacter pylori is one of the most prevalent chronic bacterial infections worldwide, colonizing approximately half of the global population. It is classified as a Group I carcinogen by the International Agency for Research on Cancer due to its causal role in gastric adenocarcinoma and gastric mucosa-associated lymphoid tissue lymphoma [1,2]. While a gradual decline in prevalence has been documented in many high-income countries, infection rates remain persistently high in several regions of Africa and the Middle East [3–5].

Persistent transmission in low-resource settings is driven by socioeconomic factors, household crowding, inadequate sanitation, and limited access to eradication therapy [6]. Chronic infection leads to gastritis and can initiate the Correa cascade, progressing through atrophic gastritis, intestinal metaplasia, dysplasia, and eventually invasive carcinoma [7]. Recent evidence demonstrates that *H. pylori* eradication significantly reduces gastric cancer incidence, particularly when implemented before advanced precancerous lesions develop [8,9]. However, increasing antimicrobial resistance has compromised treatment efficacy in many regions [10].

In Libya, published data on *H. pylori* infection are limited, and multi-year histopathological studies addressing temporal evolution and precancerous gastric lesions are scarce. This study aims to fill this gap by analyzing infection prevalence, evolving patterns, and histopathological outcomes over five years in symptomatic patients at Misurata Medical Center, providing data relevant to national prevention strategies.

Methods

Study Design and Setting

This retrospective descriptive study was conducted at the Department of Pathology, Misurata Medical Center, a major tertiary referral hospital in central Libya.

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Study Population
All gastric biopsy specimens from symptomatic patients received between January 2021 and December 2025 were reviewed. Only cases with adequate tissue for histopathological assessment were included, resulting in 201 specimens in total.

Histopathological Evaluation
Biopsy specimens were fixed in formalin, embedded in paraffin, and stained with hematoxylin and eosin. Modified Giemsa staining was used when required to identify *H. pylori*. Intestinal metaplasia and dysplasia were diagnosed according to the WHO Classification of Digestive System Tumours (5th edition).

Data Collection
Demographic data, endoscopic findings, and histopathological diagnoses were extracted from medical records.

Statistical Analysis
Data were analyzed descriptively. Associations between categorical variables were assessed using chi-square testing, with $p < 0.05$ considered statistically significant.

Ethical Considerations
The study was approved by the institutional review board of Misurata Medical Center. All patient records were anonymized to ensure confidentiality.

Results
Among 201 symptomatic patients, Helicobacter pylori infection was detected in 162 cases, corresponding to a prevalence of 80.6% (95% CI: 75.1–86.1%), substantially higher than global estimates [1,3,6]. Intestinal metaplasia was observed in 9 patients (4.5%; 95% CI: 1.6–8.4%), and epithelial dysplasia in 2 patients (1.0%; 95% CI: 0.0–2.4%), indicating early stages of the gastric carcinogenic pathway [7,8].

Yearly Prevalence
Infection prevalence increased significantly over the five-year period, rising from 54.3% in 2021 to 85.3% in 2025 ($p = 0.03$), indicating a progressive upward trend in the prevalence of H. pylori infection among symptomatic patients during the study period. This contrasts with the declining trends reported in high-income countries. [1,5].

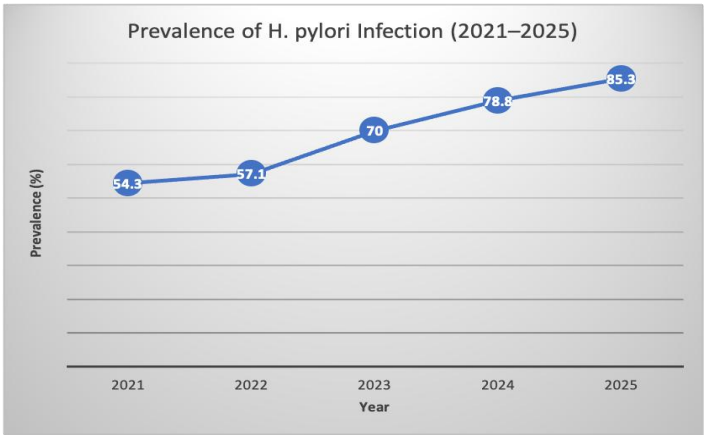

Figure 1. Prevalence of H. pylori Infection Among Symptomatic Patients (2021–2025)

Age Distribution
The mean age of patients was 45.8 ± 16.2 years, with 28% (56/201) aged ≥60 years. Premalignant lesions were predominantly observed in this older age group ($p = 0.01$), confirming cumulative inflammatory injury as a key driver of mucosal transformation [7,8].

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Table 1. Age Distribution of Symptomatic Patients

Age Group (years)	Number of Patients	Percentage (%)
<30	42	20.9
30–39	35	17.4
40–49	38	18.9
50–59	30	14.9
≥60	56	28.0
Total	201	100

Endoscopic Findings

Nodular gastric mucosa was strongly associated with *H. pylori* positivity (**82%**) compared with non-nodular mucosa (**38%**) ($p < 0.001$), consistent with prior regional studies [4,10].

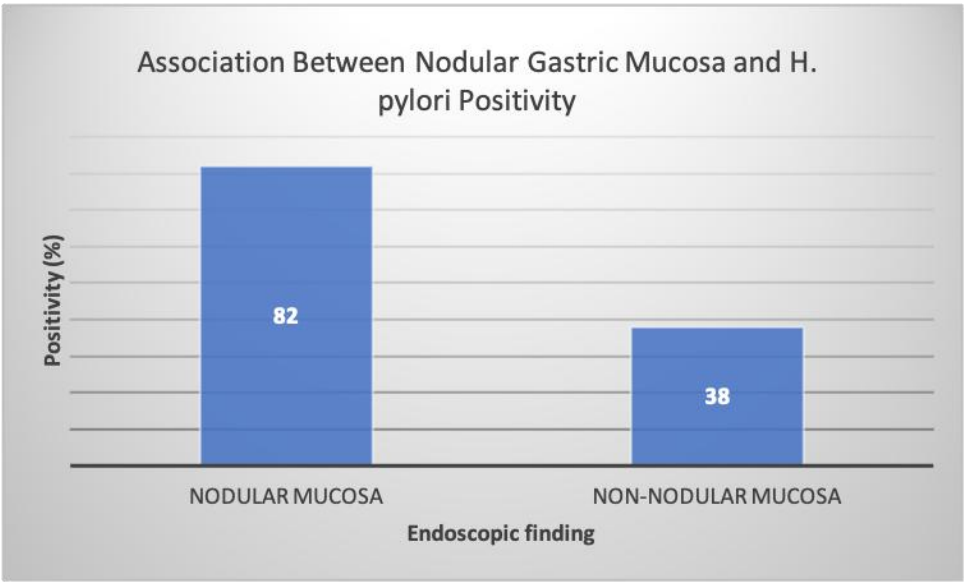

Figure 2. Association Between Endoscopic Nodular Gastric Mucosa and H. pylori Positivity

Discussion

This five-year retrospective study demonstrates that Helicobacter pylori infection remains highly prevalent in central Libya, with an overall rate of 80.6% among symptomatic patients. This prevalence is substantially higher than that reported in many high-income countries, where infection prevalence has declined below 40% [3]. In contrast, our findings align with reports from North Africa and the Middle East, where prevalence frequently exceeds 60% [4,5], emphasizing Libya's continued high-burden status. The observed increase in prevalence after 2022 likely reflects multiple interacting factors. Limited access to healthcare and diagnostic services in certain regions of Libya may delay detection and treatment, allowing persistent infection to propagate [1,6]. The COVID-19 pandemic further disrupted routine endoscopic services and antibiotic therapy, resulting in incomplete eradication and delayed follow-up [10]. Additionally, the rising prevalence of antimicrobial-resistant H. pylori strains has been documented globally, complicating standard triple or quadruple therapy regimens [11]. Socioeconomic factors, including crowded living conditions and limited public health awareness, may also facilitate transmission [3,4].

Importantly, beyond the high infection prevalence observed in this cohort, the detection of intestinal metaplasia (4.5%) and epithelial dysplasia (1.0%), although limited in number, confirms progression along the gastric carcinogenic pathway [7,8]. The significant association between advanced age (≥60 years) and premalignant lesions supports the concept of cumulative inflammatory injury over time as a key driver of gastric mucosal transformation [7,8]. Together, these findings underscore the continued risk of gastric malignancy among symptomatic Libyan patients, highlighting the urgent need for early detection and timely management.

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Population-based eradication programs have demonstrated reductions in gastric cancer incidence in high-risk regions [9,12]. The absence of coordinated national strategies in Libya likely contributes to the sustained burden of infection and associated malignancy risk. To address these challenges, several targeted interventions may be warranted:

- National H. pylori screening targeting symptomatic patients and high-risk populations.
- Standardized eradication protocols incorporating antibiotic susceptibility testing to overcome resistance.
- Structured surveillance programs for patients with premalignant gastric lesions, such as intestinal metaplasia or dysplasia.
- Public health education campaigns promoting hygiene, awareness of gastrointestinal symptoms, and timely medical consultation [2,12].

Implementation of these measures could reduce H. pylori transmission, improve eradication success, and ultimately decrease gastric cancer incidence in Libya. Future prospective multicenter studies are warranted to assess the long-term outcomes of such interventions and to monitor trends in prevalence, resistance patterns, and premalignant lesion progression.

Overall, these findings position Libya among high-prevalence regions for H. pylori infection and emphasize the importance of integrating histopathology-based surveillance into national gastric cancer prevention strategies.

Limitations

This study has several important limitations. First, it is a single-center, retrospective analysis, which may limit the generalizability of findings and introduce selection bias. Second, only symptomatic patients were included; therefore, asymptomatic infection rates could not be assessed. Third, data on treatment regimens, patient compliance, eradication success, and long-term outcomes were not collected, precluding assessment of therapeutic effectiveness.

Despite these limitations, the study provides valuable insight into the persistent high burden of H. pylori infection in central Libya and identifies key targets for public health intervention, including enhanced detection, standardized management, and risk-stratified surveillance.

Conclusion

Libya continues to show a persistently high and rising prevalence of Helicobacter pylori infection, far exceeding rates seen in many high-income countries. The presence of intestinal metaplasia and dysplasia confirms early progression along the gastric carcinogenic pathway, especially in older patients.

These findings highlight the urgent need for structured national eradication programs, standardized biopsy protocols, and risk-stratified surveillance strategies. Complementary public health measures, including education on hygiene, awareness of gastrointestinal symptoms, and improved access to diagnostics and treatment, are essential to reduce transmission, ensure effective management, and lower the future burden of gastric cancer.

Conflict of interest. Nil

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