

# *Helicobacter pylori* association with upper gastrointestinal pathologies in Northern Ghana

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## ABSTRACT

**Background:** Pathologies of *Helicobacter pylori* infection show distinct regional patterns and are unclassified for Northern Ghana. **Materials and Methods:** Demographic and clinical data of 1580 patients who underwent upper gastrointestinal endoscopy (Tamale Teaching Hospital) were assessed. **Results:** The prevalence of *H. pylori* infection was 73.4%. Patients 31–50 years-old and >50 years-old had significantly more positive *H. pylori* tests than the ≤30 year-olds (odds ratios [ORs] [95% confidence interval [CIs]]: 8.6 [6.637–11.22] and 6.1 [4.609–8.203]; both,  $P < 0.0001$ ). Presenting symptoms were epigastric pain (67.3%), abdominal pain (21.5%), hematemesis (7.6%), and dysphagia (2.0%). *H. pylori* was diagnosed in 72.5% of patients with duodenal ulcers and 77.0% with gastric ulcer ( $n = 444$ ). Gastric ulcer was significantly associated with *H. pylori* (OR [95% CI]: 1.3 [1.01–1.69],  $P = 0.042$ ), and gastritis showed a positive but not statistically significant association. **Conclusions:** In Northern Ghana, *H. pylori* infection is associated with gastritis, gastric ulcer, and duodenal ulcer and is most common in middle-aged adults (31–50 years old).

**Key words:** Endoscopy, gastrointestinal pathology, *Helicobacter pylori* infection, Northern Ghana

## Introduction

The prevalence of *Helicobacter pylori* is highly variable, depending on factors such as geography, ethnicity, age, and socioeconomics. Middle-aged adults are most frequently affected and the highest incidence rates are in developing countries (>80% vs. 20%–50% in industrialized countries).<sup>[1]</sup> *H. pylori* infection causes chronic gastritis and peptic ulcers and is involved in the development of gastric carcinoma.<sup>[2]</sup> It has been a challenge, thus far, in Northern Ghana to demonstrate an association between upper gastrointestinal (GI) endoscopy diagnosis and causes of dyspepsia, due to lack of equipment and personnel for such studies.

The high prevalence of *H. pylori* infection in developing countries makes it a public health issue requiring

strategic intervention. However, generating and implementing a successful intervention strategy is dependent on a basis of empirical data. Tabiri *et al.*<sup>[3]</sup> previously performed a study in the northern region of Ghana and reported evidence of a relationship between *H. pylori* and endoscopic findings. The current study's objective was to demonstrate the association between *H. pylori* infection and upper GI pathologies among patients in Northern Ghana.

## Materials and Methods

### Study design and features

This was a cross-sectional, retrospective study of data obtained from medical records of patients who underwent upper (U) GI endoscopy at the Minimal

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Access Therapy and Operative Endoscopy Unit of the Department of Surgery at the Tamale Teaching Hospital (TTH) between October 2010 and October 2014. The TTH is the third largest teaching hospital in Ghana and serves the northern region of the country but also receives patients from neighboring Burkina Faso and Togo (the northern region). All UGI endoscopy procedures were performed by general surgeons with training and experience using the EVIS 140 series videoendoscopy system (Olympus Corp., Shinjuku, Tokyo, Japan).

Patient data for age, sex, indications for referral for UGI endoscopy, clinical diagnosis, endoscopy findings, histopathology reports, and urease test results were retrieved from the hospital's records. Ethical clearance was obtained from the Internal Review Board of the TTH for all records reviewed in the study period.

**Statistical analysis**

Data were analyzed using SPSS statistical software, version 16.0 (SPSS Inc., Chicago, IL, USA). Fisher's exact test was used to determine the association between urease test results and histopathology findings.  $P < 0.05$  was considered statistically significant.

**Results**

**Patient profiles**

A total of 1580 patients underwent UGI endoscopy at TTH during the 4-year study period. The patients included 799 (50.6%) males and 781 (49.4%) females. The mean age of the total population was  $41.1 \pm 16.2$  years (range: 6–89 years), with males slightly older than females [ $40.2 \pm 16.2$  years vs.  $39.3 \pm 16.5$  years; Figure 1]. The largest age group represented was 31–50 years old (41.7%), followed by  $\leq 30$  years (33.5%).

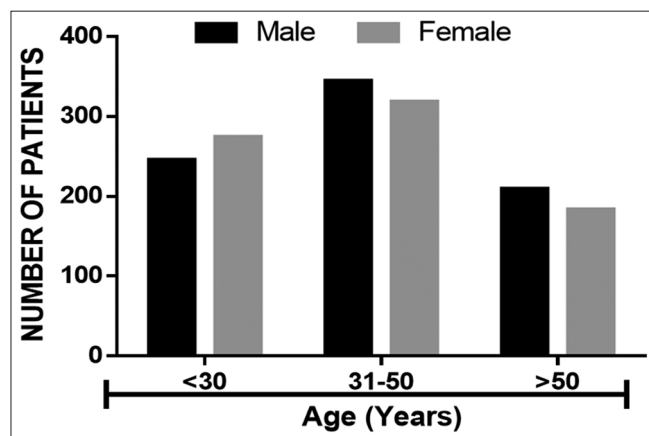


Figure 1: Age distribution of patients stratified by sex

**Helicobacter pylori infection rates**

Among the total study population, 73.4% showed positivity on *H. pylori* infection (urease) test. The age-specific prevalence rates are presented in Table 1. The proportion of positive *H. pylori* test results was significantly higher in the 31–50 years old and >50 years old age groups than that in the  $\leq 30$  years old group (odds ratio [OR] [95% confidence interval [CI]]: 8.6 [6.637–11.22] and 6.1 [4.609–8.203]; both,  $P < 0.0001$ ). The proportion of male patients with positive *H. pylori* test results was not, however, significantly different from that of the females (OR [95% CI]: 0.9 [0.745–1.166];  $P < 1.00$ ).

**Presenting symptoms**

The most common presenting symptom was epigastric pain, followed by abdominal pain, hematemesis, and dysphagia [Table 2]. The remaining symptoms were grouped as “other” and included heartburn, belching, and hiccups. The patients who presented with epigastric pain had the largest proportion of positive test for *H. pylori*, followed by those who presented with abdominal pain and hematemesis [Table 2].

**Endoscopy findings**

The most common endoscopic finding was gastritis, followed by gastric ulcer and gastric cancer [Figure 2]; less frequent was gastric and duodenal ulcers, duodenal ulcers, and gastric cancers.

Patients with duodenal ulcers and those with gastric ulcers had the highest rates of positivity for *H. pylori* infection [Table 3]. While the presence of duodenal ulcer was not significantly associated with *H. pylori* infection (OR [95% CI]: 0.95 [0.64–1.39]) that of gastric ulcer was (OR [95% CI]: 1.3 [1.01–1.69]). There was also a positive association between gastritis and *H. pylori* infection even though it was not statistically

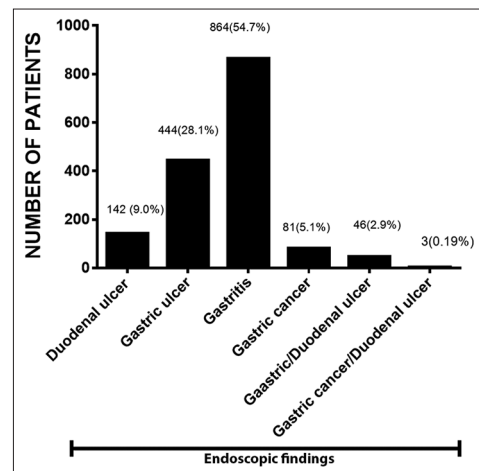


Figure 2: Distribution of endoscopic findings

**Table 1: Prevalence of *Helicobacter pylori* stratified by age and sex**

Parameter	Total	Urease test-positive	Urease test-negative	P
Age (years)				
≤30	529 (33.5)	389 (24.6)	140 (8.9)	<0.0001
31-50	659 (41.7)	500 (31.6)	159 (10.1)	
>50	392 (24.8)	272 (17.2)	120 (7.6)	
Total	1580 (100.0)	1161 (73.5)	420 (26.6)	
Sex				
Male	799 (50.6)	592 (37.5)	207 (13.1)	<0.0001
Female	781 (49.4)	568 (36.0)	213 (13.4)	
Total	1580	1160 (73.5)	420 (26.5)	

Data are presented as n (%)

**Table 2: Distribution of major presenting symptoms of the patients**

Main symptom	Total	Urease test-negative	Urease test-positive
Epigastric pain	1063 (67.3)	275 (17.4)	788 (67.9)
Abdominal pain	340 (21.5)	87 (5.5)	253 (21.8)
Hematemesis	120 (7.6)	44 (2.8)	76 (6.5)
Dysphagia	31 (2.0)	5 (0.3)	26 (1.6)
Other	26 (1.6)	8 (0.5)	18 (1.1)

Data are presented as n (%)

**Table 3: Relationship between upper gastrointestinal lesions and *Helicobacter pylori* infection**

Endoscopic finding	Total	Positive	Negative	P
Duodenal ulcer	142 (9.0)	103 (72.5)	39 (27.5)	0.77
Gastric ulcer	444 (28.1)	342 (77.0)	101 (22.7)	0.042
Gastritis	864 (54.7)	651 (75.3)	213 (24.7)	0.076
Gastric cancer	81 (5.1)	35 (43.2)	46 (56.8)	<0.0001
Gastric and duodenal ulcers	46 (2.9)	29 (63.0)	17 (37.0)	0.123
Gastric cancer and duodenal ulcer	3 (0.19)	1 (33.3)	2 (66.7)	0.173

Data are presented as n (%)

significant (OR [95% CI]: 1.2 [0.98–1.54]). Nearly one-half of the gastric cancer patients tested positive for *H. pylori* infection.

Some patients had multiple endoscopy findings, including gastric and duodenal ulcers (OR [95% CI]: 0.60 [0.33–1.11]) and gastric cancers and duodenal ulcers (OR [95% CI]: 0.17 [0.016–1.98]); however, multiple pathologies did not showed a statistically significant association.

## Discussion

This North Ghanaian patient population contained a high level of *H. pylori* infected-individuals, similar to reports from other parts of Africa<sup>[4-6]</sup> and to one from

the southern part of Ghana.<sup>[7]</sup> This is in contrast to two other studies of Ghanaians, which found lower rates.<sup>[8,9]</sup> The current study found the highest prevalence of *H. pylori* infection in adults over 30 years of age, which is similar to the previous studies<sup>[10]</sup> but also differ from one which demonstrated decreasing incidence of *H. pylori* with advancing age.<sup>[11]</sup> Our study population showed no significant association between sex and *H. pylori* infection. This finding is consistent with a previous report from Uganda<sup>[12]</sup> but, again, differs from other studies that found a strong association with sex.<sup>[13,14]</sup> However, we did find a significant association between *H. pylori* infection and peptic ulcer disease, as suggested by two other studies.<sup>[15,16]</sup>

*H. pylori* infection plays an important role in the development of gastritis<sup>[17]</sup> which is consistent with the observations in our study population. Yet while previous studies have demonstrated the significant association of gastric cancers and *H. pylori* infection,<sup>[18,19]</sup> we found no significant association with the various subtypes of gastric adenocarcinoma. In contrast to our findings, Kuipers *et al.*<sup>[20]</sup> reported that in Kenya, the incidence of gastric cancer is moderately associated with the prevalence of *H. pylori* infection.

Our study did not demonstrate any statistically significant association between *H. pylori* infection and presence of duodenal ulcer, unlike findings reported from a previous study.<sup>[21]</sup> This apparent discrepancy in findings may be attributable to the small proportions of patients with duodenal ulcer in the current study.

Collectively, the findings from this study show the distinctive profile of *H. pylori* infection and upper GI pathologies in Northern Ghana and form a basis on which strategic intervention strategies may be developed for this particular region.

## Conclusions

Among Patients in Northern Ghana, *H. pylori* infection is associated with upper GI pathologies and is most common in middle-aged adults (31–50 years old).

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### Conflicts of interest

There are no conflicts of interest.

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