

## GASTRITIS WITH H-PYLORI INFECTION IN RELATION WITH MUCOSAL WALL THICKENING /ANTRAL WALL THICKENING RATIO

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### ABSTRACT

**Background:** Gastritis is a mucosal inflammation caused by *H. pylori* infection, autoimmune diseases, bile reflux, and alcohol. It's linked to various gastroduodenal diseases. In Iraq, *H. pylori* prevalence is 11.3-71.3%. Diagnosis varies based on sensitivity, specificity, and cost. **Aim:** To evaluate several approaches for determining the prevalence of *H. pylori* in Iraqi patients with the gold standard method of qPCR. **Methodology:** A cross-sectional study was conducted at Al-Selekh Primary Health Care Center, Al-Numaan Hospital, and Dr. Ali Al-Saji private clinic, involving 120 patients with dyspepsia. The patients were divided into two groups based on diagnosis: those diagnosed with gastritis with *Helicobacter pylori* diagnostic tests and those without. The patients were categorized based on their history of dyspepsia and were asked to undergo upper gastrointestinal tract endoscopy, biopsy, abdominal ultrasonography, and blood tests. The data was analyzed using IBM-SPSS 26. **Results:** The study involved 160 patients with gastritis, with 60 in groups A and B. The mean age was  $36.71 \pm 14.599$  years, with no significant difference. Males constituted 35.0% of group A and 48.3% of group B, while females were 65.0% and 51.7% respectively. Antral wall thickness was higher in group A ( $4.80 \pm 1.098$ ) than group B ( $3.45 \pm 1.113$ ), and mucosal wall thickness was higher in group A ( $2.88 \pm 0.810$ ). **Conclusion:** The study found that the antral and mucosal thickness were associated with *H. pylori* in patients with gastritis and differed significantly from those in non *H. pylori* gastritis.

**KEYWORDS:** Antral Wall Thickening, Gastritis, H-pylori, Mucosal Wall Thickening.

### INTRODUCTION

Gastritis is an inflammation of the mucosa that can cause a number of clinical symptoms, including nausea, vomiting, upper abdominal discomfort, and a fullness sensation.<sup>[1]</sup>

The most prevalent cause of gastritis is *H. pylori* infection (HPI), although there are other reasons as well, including as autoimmune disorders, alcohol use, bile reflux, and non-steroidal anti-inflammatory medication usage.<sup>[2]</sup>

Histopathological, endoscopic, and clinical examinations might be used to diagnose arthritis.<sup>[3-6]</sup>

An infection with the human pathogen *Helicobacter pylori* is significantly linked to a variety of gastroduodenal disorders, such as non-cardiac gastric cancer, peptic ulcer, atrophic gastritis, chronic active gastritis, and mucosa-associated lymphoid tissue

lymphoma.<sup>[7]</sup> *H. pylori* infection is more common in poor nations than in industrialized ones, with rates ranging from 70% to 90%.<sup>[8]</sup> Reliable data and information on the frequency of this bacteria are currently unavailable, based on a small number of research conducted in Iraq. There was a prevalence of *H. pylori* in Iraq between 11.3% to 71.3%, according to a few research.<sup>[9]</sup>

There are several methods for detecting *H. pylori* infection, including invasive as, well, as non-invasive. The microbiological culture, rapid urease test (RUT), and biopsy-based polymerase chain reaction are examples of invasive procedures.<sup>[6]</sup> Non-invasive methods include the well-established stool antigen test (SAT), urea breath test (UBT), and serological tests such as *Helicobacter pylori* AB.<sup>[10]</sup> The selection of the necessary method plan is influenced by several elements, such as cost-based concerns, clinical state, sensitivity, and specificity. Because of this, the limits, advantages, and

disadvantages of each test differ according to the clinical setting and patient's medical background.<sup>[6,11]</sup>

The optimal method for identifying *H. Pylori* in Iraq is still up for debate, and there is a dearth of information about the reliability of various diagnostic approaches. Furthermore, there is a dearth of epidemiological data about the incidence of *H. pylori* in Iraq.<sup>[12]</sup>

**AIM OF THE STUDY:** To evaluate several approaches for determining the prevalence of *H. pylori* in Iraqi patients with the gold standard method of qPCR.

#### METHODOLOGY

A health institutions based cross sectional study was carried on in Al-Selekh Primary Health Care Center, Al-Numaan Hospital, and Dr. Ali Al-Saji private clinic, which were all registered in the Iraqi Ministry of Health on total of 120 patients during the period of 10<sup>th</sup> September 2022 to 13<sup>th</sup> May 2024.

The sample was chosen with simple random technique and classified according to the inclusion criteria into two groups, each group consist of 60 patients, all groups suffers from dyspepsia, but differ in diagnosis.

The first selected group diagnosed as gastritis with all the Helicobacter pylori diagnostic tests are positive, as the histologically confirmed gastritis with positive biopsy of helicobacter pylori, urea breath test positive, helicobacter pylori antibody and antigen positive.

The second group diagnosed as gastritis without the Helicobacter pylori diagnostic tests are negative.

The samples selected according to the history taking as they suffer from dyspepsia as the main symptom. Then

the subject categorized into the first group or the second, then each patient asked to take upper gastrointestinal tract endoscopy with biopsy if needed, also many subjects had the upper gastrointestinal tract endoscopy with biopsy, then asked to take the abdominal ultrasonography, and the blood tests, as we depend on it to categorize the patient accordingly.

#### Statistical Analysis

Microsoft Excel 2010 sheets were used to summarize the study's data collection. The IBM-SPSS 26 statistical analysis program was used. The parametric tests were selected after the Shapiro-Wilk test was used to determine whether these data were normal. The independent t-test for two means was used to find the difference between the numerical data while the chi square used for the categorical data. ROC test was performed to find the area under curve (AUC) with cut-off point, sensitivity, specificity, positive, and negative predictive values. The AUC indicators were; 1.000-0.900 excellent, 0.900-0.800 good, 0.800-0.700 fair, 0.700-0.600 poor. The p-value  $\leq 0.05$  considered as significant.

#### RESULTS

The current study included 160 patients; 60 patients with gastritis in each groups; group A involved patients with *H. pylori* while group B had no *H. pylori*. The mean age of patients among group A was  $36.71 \pm 14.599$  years and among group B was  $36.81 \pm 16.465$  years with no significant statistical difference ( $p=0.097$ ). Males constituted 35.0% of group A and 48.3% of group B while the females found in 65.0% and 51.7% of groups A and B respectively; the difference was statistically not significant ( $p=0.139$ ) as shown in table (1).

**Table 1: Comparison of age and sex between the studied groups.**

	Group A (n=60)	Group B (n=60)	P-value
Mean age /years	36.71±14.599	36.81±16.465	0.097*
Sex	No. (%)	No. (%)	P-value
Males	21(35.0)	29(48.3)	0.139**
Females	39(65.0)	31(51.7)	

\*Independent t-test for two means; \*\*Chi square test

Antral wall thickness (AWT) among the group A was ( $4.80 \pm 1.098$ ) which was higher than that among the group B ( $3.45 \pm 1.113$ ) in a statistically significant association ( $p=0.000$ ). Also, the mucosal wall thickness (MWT) showed a significant higher ( $p=0.000$ ) mean

among the group A ( $2.88 \pm 0.810$ ) than among the group B ( $2.17 \pm 0.812$ ). While the difference regarding the ratio was statistically not significant ( $p=0.237$ ) as shown in table (2).

**Table (2): Comparison of the studied parameters.**

Parameters	Group A	Group B	P-value*	95% CI
Antral Wall Thickness	4.80±1.098	3.45±1.113	0.000	0.949; 1.749
Mucosal Wall Thickness	2.88±0.810	2.17±0.812	0.000	0.409; 0.996
Ratio	0.635±0.266	0.704±0.362	0.237	-0.183; 0.045

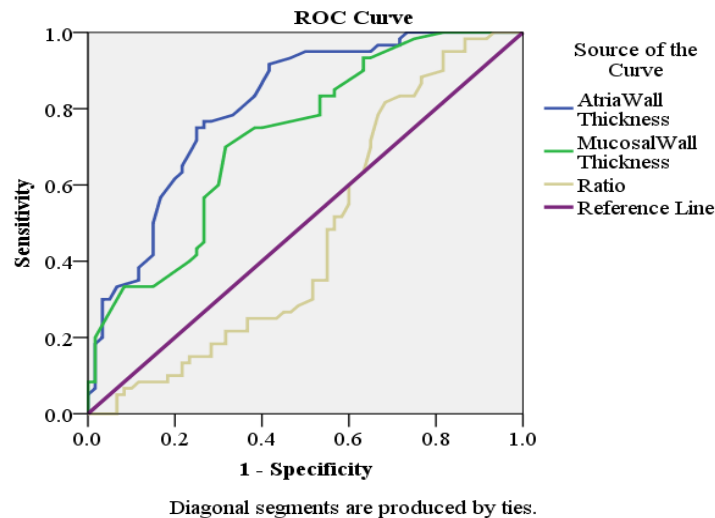
\*Independent t-test for two means

The ROC test was performed and the area under the curve was estimated for the studied parameters; the antral wall thickness had the area of (80.8%) which was higher than the area of mucosal wall thickness (72.6%);

both had statistically significant associations ( $p=0.000$ ) as shown in table (3) and figure (1).

**Table 3: Area Under the Curve.**

Test Result Variable (s)	Area	Std. Error	p-value	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Antral Wall Thickness	0.808	0.039	<b>0.000</b>	0.730	0.885
Mucosal Wall Thickness	0.726	0.046	<b>0.000</b>	0.637	0.816
Ratio	0.467	0.054	0.534	0.360	0.574



**Figure (1): ROC test for the studied parameters.**

The table (4) demonstrated the cut-off point for AWT, MWT, and ratio among the studied sample.

**Table 4: Sensitivity, specificity, PPV, and NPV.**

Positive if $\geq$ to		Sensitivity%	Specificity%	PPV%	NPV%
Antral Wall Thickness	4.04	75.0	75.0	74.0	74.0
Mucosal Wall Thickness	2.35	75.0	61.3	73.8	60.5
Ratio	0.505	60.0	40.0	58.5	39.3

**DISCUSSION**

The antrum is often the most inflammatory region, and HP commonly colonizes the submucosal layer. One of the most significant radiographic indicators of gastrointestinal disorders is thickening of the stomach wall. The mucosal layer is expected to thicken as a result of mucosal erosion brought on by the growth of HP. Likewise, the thickness of the submucosal layer and mucosal layer (together with the muscularis mucosa) may increase in tandem with the degree and intensity of inflammatory alterations.<sup>[13]</sup>

The current study found that there was no statistically significant difference between the patient with gastritis who diagnosed as positive. This finding was corresponding to that reported by Cakmakci *et al.*,<sup>[14]</sup> who exhibited no statistically significant difference between the two studied groups with respect to age ( $p=0.747$ ). In a study conducted by Zhao *et al.*,<sup>[15]</sup> the

mean were  $45.9 \pm 13.9$  years and  $47.9 \pm 13.4$  years among the patients with and without *H.pylori* respectively with no significant difference between groups ( $p=0.082$ ).

Regarding the sex, the current study showed female predominance in both studied groups but the difference was statistically not significant. Zhao *et al.*,<sup>[15]</sup> found the female predominance in their groups with showed significant difference in terms of gender ( $p=0.007$ ).

Gastritis with *H.pylori* infection can result in thickening of the gastric antral wall. This thickening can be used as a diagnostic clue for *H. pylori* infection. Studies suggest that antral wall thickening (AWT) exceeding 4.94 mm, or antral-to-mucosal wall thickness (MLT) ratio greater than 0.48 mm detected in patients with gastritis, may indicate *H. pylori* infection.<sup>[16,17]</sup> CT manifestations of *H. pylori* gastritis often include prominent circumferential antral wall thickening. However, it's worth noting that

antral wall thickening can also be a normal finding.<sup>[17]</sup> When evaluating antral wall thickening in the context of gastritis, it is essential to consider other factors and supporting diagnostic evidence.<sup>[16,17]</sup> The current study showed AWT and MLT were significantly higher among *H. pylori* gastritis group than those among the non *H. pylori* gastritis group. These findings were similar to that reported by a study conducted by Zaher *et al.*,<sup>[18]</sup> in which the AWT, MLT and MLT/AWT ratio were significantly higher among the patient in the *H. pylori* gastritis group ( $5.65 \pm 0.58$ ,  $3.02 \pm 0.43$ ,  $0.53 \pm 0.04$  respectively) than non-*H. pylori* gastritis group ( $4.57 \pm 0.82$ ,  $2.07 \pm 0.41$ ,  $0.45 \pm 0.02$  respectively) while the control group had ( $3.93 \pm 0.52$ ,  $1.49 \pm 0.2$ ,  $20.37 \pm 0.03$  respectively). Furthermore, it was observed by Mazaher *et al.*<sup>[19]</sup> and Yazar *et al.*<sup>[20]</sup> that patients with *H. pylori* gastritis had a significantly higher AWL than patients with *H. pylori*-negative gastritis; Yazar and his colleagues reported that the diagnosis of gastritis could be made with ease from the measurements of the wall thickness, while Mazaher and his coworkers conducted a study on 100 children with clinical presentations and came to the conclusion that the US could expect certain endoscopic evaluation findings and reduce the number of endoscopic assessments in children exhibiting clinical features of gastritis.

The Receiver Operating Characteristic (ROC) test, a statistical method for evaluating the performance of diagnostic tests, has been used to diagnose *H. pylori* infection in the gastric mucosa.<sup>[21]</sup> However, the search results do not provide direct evidence on the relationship between *H. pylori* infection and mucosal wall thickening specifically in the context of gastritis.

Since *H. pylori* infection causes mucosal damage, it's plausible that the thickening of the gastric wall could be a symptom of *H. pylori*-related gastritis. However, it's important to note that a thickened gastric wall is not always indicative of *H. pylori* infection, as it can also be seen in normal conditions.<sup>[22, 23]</sup>

For a more definitive diagnosis, abdominal ultrasonography and high-resolution endoscopy can be used to visualize the layers of gastric wall and measure thickness. Whereas the ROC curve for *H. pylori* infection of conventional endoscopy was 0.811 in the corpus, the accuracy of endoscopic diagnosis of *H. pylori* infection has been reported to be 0.726.<sup>[18, 24]</sup> The current study showed that the areas under the curve for AWT and MWT were 0.808 and 0.726 respectively with statistically significant associations ( $p=0.000$ ). This was in line with the findings of Kato *et al.*,<sup>[25]</sup> in which, 275 patients were examined, the area under the ROC curve for *H. pylori* infection of conventional endoscopy was 0.811 in the corpus and 0.707 in the antrum ( $p=0.006$ ).

Furthermore, the present investigation demonstrated that an AWT of 4.04 mm had a 74.0% PPV, a 75.0% NPV, a 75.0% sensitivity, and a 75.0% specificity. In the

meanwhile, the sensitivity, specificity, PPV, and NPV of the MWT at 2.35 mm were 75.0%, 61.3%, 73.8%, and 60.5%. These parameters were somewhat lower than those found in the study by Zaher *et al.*<sup>[18]</sup>, which found that the best cutoff values for AWT, MLT, and MLT/AWT ratio were  $> 4.94$  mm,  $> 2.46$  mm, and  $> 0.48$  mm, respectively, for identifying *H. pylori* infection in symptomatic gastritis patients. Although Swenson and Wallach<sup>[13]</sup> reported that AWT larger than 4 mm is highlighted as suggestive gastritis and that obvious transmural gastric wall thickening is a characteristic sign of the disease, This may be explained by the impact of *H. pylori* infection on the thickness of the stomach wall as a result of its many virulent agents, which increase the inflammation and pathogenicity of the stomach wall and, consequently, the wall thickening.

## CONCLUSION

The study found that the antral and mucosal thickness were associated with *H. pylori* in patients with gastritis and differed significantly from those in non *H. pylori* gastritis.

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