

Review

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Review

The Prevalence of the Symptom of Burning Pain That Worsens When the Stomach Is Empty in Patients with *H. pylori* Infection (Diagnostic Measure)

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Abstract

Helicobacter pylori infection is a common gastrointestinal condition, more often seen in people living in crowded or less sanitary environments. In many cases, it is not detected until symptoms develop, rather than through routine screening. In this retrospective study, we reviewed patient records from a private laboratory to examine the relationship between gastrointestinal symptoms and *H. pylori* stool antigen (HpSAG) test results. Patients were also grouped by age to better understand how symptoms present across different life stages. The main aim of this study was to examine whether specific symptoms—particularly burning upper abdominal pain that worsens on an empty stomach—could help clinicians better identify patients who are more likely to benefit from testing. The idea was to support more targeted testing strategies, reduce unnecessary investigations, and ultimately help lower healthcare costs without compromising diagnostic accuracy. We assessed a range of gastrointestinal symptoms, including bloating, belching, nausea, vomiting, difficulty swallowing, early satiety, loss of appetite, weight loss, diarrhea, constipation, and melena, and compared them between infected and non-infected patients and across age groups. Burning epigastric pain was seen more often in patients with *H. pylori*, and overall, infected patients tended to report more symptoms, although this varies depending on age. It is important to emphasize that this study does not propose using symptoms as a replacement for diagnostic testing. Since the study was retrospective and did not include comparison with gold-standard methods such as the urea breath test or endoscopic biopsy, the findings should be interpreted as associations rather than definitive diagnostic conclusions. Still, the results suggest that certain symptom patterns—particularly burning epigastric pain on an empty stomach—may be useful for identifying patients more likely to benefit from testing. Further prospective studies are needed to confirm these observations. **Materials and Methods:** This retrospective observational study was conducted at Wilson Laboratory (Shush Square) in Tehran, Iran, using existing patient records. A total of 589 patients were included and classified as *Helicobacter pylori*-positive or *Helicobacter pylori*-negative based on stool antigen test (SAT) results. To better explore how symptoms differed across age groups, patients were divided into predefined age categories. These groups were selected to ensure a balanced distribution of cases and to make the comparisons clearer and easier to interpret. All stool antigen tests were performed using a commercially available enzyme immunoassay kit. Because the study was retrospective, detailed information about the assay characteristics—such as whether monoclonal or polyclonal antibodies were used, or the specific antigen targets (e.g., CagA or UreC) was not available. It is also recognized that test performance may vary depending on these factors, with monoclonal-based assays generally showing higher sensitivity and specificity. Gastrointestinal symptoms were extracted from patient records and compared between the *H. pylori*-positive and *H. pylori*-negative groups. The relationship between symptom patterns and infection status was then explored across different age groups using descriptive statistical analysis. **Results:** Of the 589 participants included in the study, 353 (59.9%) were *Helicobacter pylori*-positive and 236 (40.1%) were

H. pylori-negative based on stool antigen test (SAT) results. *H. pylori* infection was significantly associated with burning epigastric pain that worsens on an empty stomach ($p < 0.00001$). Other gastrointestinal symptoms also showed significant associations with positive SAT results, including bloating ($p = 0.012$), persistent vomiting ($p = 0.029$), dysphagia ($p < 0.00001$), diarrhea ($p = 0.0003$), constipation ($p = 0.0001$), and melena (black, tarry stools) ($p < 0.00001$). The magnitude of these associations varied across age groups. Burning epigastric pain that worsens on an empty stomach demonstrated a sensitivity of 76.2% and a specificity of 95.8% for identifying *H. pylori* infection. The positive predictive value (PPV) was 96.4%, and the negative predictive value (NPV) was 72.9%. **Conclusions:** Overall, having at least one gastrointestinal symptom was strongly associated with *Helicobacter pylori* infection across all age groups. Among the symptoms studied, burning epigastric pain that worsens when the stomach is empty showed the strongest association with infection. Its relatively high specificity and positive predictive value suggests that it may be helpful in guiding clinicians when deciding which patients should be prioritized for testing. At the same time, because this was a retrospective study, these findings should be interpreted with caution. Further prospective studies are needed to better understand and confirm how useful symptom-based approaches can be in routine clinical practice.

Keywords: *Helicobacter pylori*; stool antigen test; epigastric pain; dyspepsia; gastrointestinal symptoms; symptom-based assessment

1. Introduction

Helicobacter pylori (*H. pylori*) is a spiral-shaped Gram-negative bacterium that colonizes the gastric and duodenal mucosa and affects more than half of the world's population [1]. It is usually transmitted through fecal-oral, oral-oral, and gastro-oral routes, often via contaminated food, water, saliva, or vomitus. The infection is more common in crowded environments and areas with poor sanitation and lower socioeconomic conditions [2–5]. Long-standing infection is strongly linked to gastritis and peptic ulcer disease and may eventually lead to more serious outcomes such as gastric cancer and mucosa-associated lymphoid tissue (MALT) lymphoma [3,8,9]. Because of these risks, early diagnosis and treatment are important.

In everyday clinical practice, testing for *H. pylori* is generally considered when patients present with upper gastrointestinal complaints suggestive of dyspepsia or peptic ulcer disease [4,7]. Several diagnostic options are available, including invasive methods such as endoscopy with biopsy-based tests (histology, culture, rapid urease test, and molecular assays), as well as noninvasive approaches like serology, urea breath testing, and stool antigen tests [10–17]. Although these methods are reliable, their cost, limited availability, and, in some cases, invasive nature can make routine use challenging, especially in low-resource settings. This often leads to delays in diagnosis and treatment, allowing the infection to persist and increasing the risk of transmission and complications.

A number of studies have tried to use symptoms to guide decisions about testing for *H. pylori*, with most focusing on dyspepsia [15,16,21,22]. However, dyspepsia is a very broad term that includes non-specific symptoms such as bloating, epigastric discomfort, and nausea, which can also be seen in many other gastrointestinal or systemic conditions. This limits its usefulness as a reliable clinical indicator.

Current guidelines recommend treating all patients with confirmed active *H. pylori* infection. However, due to increasing antibiotic resistance, treatment guided by susceptibility testing is preferred when eradication rates with standard regimens fall below 90% or after initial treatment failure [8,24].

Despite this, it is still unclear whether more specific symptom patterns can help distinguish between patients who are infected and those who are not. Burning epigastric pain that worsens on an empty stomach is traditionally considered a characteristic feature of *H. pylori*-related disease, but its true diagnostic value has not been clearly established.

For this reason, the present study examined how often burning epigastric pain occurs in *H. pylori*-positive and -negative patients and also looked at how other gastrointestinal symptoms vary across different age groups. The aim was to better understand whether specific symptom patterns could help clinicians identify patients more likely to be infected and support more targeted and cost-effective testing strategies, particularly in settings with limited resources.

2. Literature Review

Helicobacter pylori (*H. pylori*) is a Gram-negative, spiral-shaped bacterium that colonizes the gastric and duodenal mucosa and affects more than half of the global population [1–4]. Transmission mainly occurs through person-to-person contact or ingestion of contaminated food and water, and its prevalence is higher in areas with crowded living conditions, poor sanitation, and limited resources [2–5]. Chronic infection is a well-established cause of gastritis and peptic ulcer disease and is also strongly linked to more serious outcomes, including gastric adenocarcinoma and mucosa-associated lymphoid tissue (MALT) lymphoma [3,5–9]. For this reason, timely diagnosis and appropriate treatment remain essential to reduce the risk of long-term complications.

Diagnosis may use invasive methods, like endoscopic biopsy-based testing, or noninvasive tests including serology, urea breath tests (UBT), and stool antigen testing (SAT) [10–14]. These diagnostic modalities vary in accuracy. Sensitivity and specificity values reported include 81% and 73% for saliva antibody testing, 86% and 91% for urine assays, 85% and 79% for serologic kits, 94.7% and 95.7% for UBT, and 93.1% and 92.8% for SAT, which is currently considered the noninvasive gold standard [14–19]. Despite their diagnostic usefulness, these tests are not always easily accessible in routine practice, as they may be costly, invasive, or unavailable in resource-limited settings [3,10]. This issue is particularly relevant in underserved populations, where socioeconomic conditions strongly influence infection rates. In fact, studies have shown that *H. pylori* infection is nearly twice as common among individuals from the poorest households and about 19% higher in larger families living in crowded conditions [21,23]. At the community level, *H. pylori* infection and its associated outcomes, such as gastric cancer, as well as other factors, including alcohol consumption, source of drinking water, and type of sanitation facility, need further investigation to reduce prevalence and transmission. Public health strategies such as health education programs emphasizing hand hygiene and hand washing, improved access to safe water, and routine screening at primary healthcare centers may help reduce the disease burden [21,23]. Because of these barriers, many individuals postpone or avoid testing, which can lead to ongoing infection, continued transmission within households, and a higher risk of developing more difficult-to-treat strains over time. Although the overall global prevalence of *H. pylori* infection in adults has declined over the past three decades, this improvement has not been mirrored in younger populations, where rates among children and adolescents have remained relatively stable. These findings suggest that public health strategies that reduce *H. pylori* prevalence as a means of lowering gastric cancer incidence should be further evaluated in large-scale clinical trials [10,20].

Several studies have examined the use of symptoms to help the diagnosis of *H. pylori*, showing links between symptom burden and infection rates [21,22]. However, most investigations have focused on nonspecific dyspeptic symptoms, which are common in many gastrointestinal and systemic conditions and therefore lack diagnostic specificity [8,24]. The objective of this study was to evaluate the prevalence of gastrointestinal symptoms particularly burning epigastric pain that worsens on an empty stomach and to assess their association with *Helicobacter pylori* stool antigen positivity among patients undergoing testing. The study further aimed to explore whether specific symptom patterns may help guide more targeted and cost-effective use of diagnostic testing, rather than replace confirmatory diagnostic approaches.

3. Materials and Methods

3.1. Study Design and Setting

This was a single-center retrospective observational study conducted in Tehran, Iran, using patient records from the Wilson Laboratory (Shush Square). The study covered the period from 22 May 2021 to 11 June 2022.

3.2. Data Collection and Study Population

Patient records were reviewed to collect relevant demographic and clinical information, including age, sex, medical and medication history, presenting complaint, and *Helicobacter pylori* test results. Only patients who had undergone the *H. pylori* stool antigen test (SAT), a widely used non-invasive diagnostic method, were included in the analysis.

In total, 719 records were screened. Records were excluded if essential information, such as age, sex, medical or medication history, or presenting complaint, was missing ($n = 130$). Additional exclusion criteria included a history of liver, renal, or hematological disease, malignancy, or pregnancy. Patients were also excluded if they had used proton pump inhibitors, H2-receptor antagonists, bismuth compounds, antibiotics (including amoxicillin, metronidazole, or clarithromycin), or nonsteroidal anti-inflammatory drugs within the past 4 weeks prior to testing. Individuals with known allergies to these medications were also excluded. To reduce potential bias in symptom reporting, patients younger than 18 years were excluded. After applying all criteria, 589 patients remained in the final study population.

The minimum required sample size was estimated using a standard formula, with a calculated minimum of 185 participants.

3.3. Case Definition and Grouping

Patients were categorized as either *H. pylori*-positive or *H. pylori*-negative based on stool antigen test results. The SAT was performed using a commercially available enzyme immunoassay kit.

3.4. Variables and Outcomes

Descriptive analysis was used for all variables. The main focus was on gastrointestinal symptoms documented in patient records. These included absence of symptoms, bloating, nausea, persistent vomiting, burning epigastric pain that worsens on an empty stomach, dysphagia, unintentional weight loss (>3 kg in the past month), early satiety or loss of appetite, diarrhea, constipation, and melena (black, tarry stools). The frequency of each symptom was calculated separately for the *H. pylori*-positive and -negative groups.

3.5. Statistical Analysis

Associations between categorical variables were evaluated using the Chi-square test, with statistical significance set at $p < 0.05$ and a 95% confidence level.

For a more detailed assessment of burning epigastric pain that worsens on an empty stomach, patients were divided into seven age groups: 18–25, 26–33, 34–41, 42–49, 50–57, 58–65, and ≥ 65 years. The frequency of this symptom within each age group was calculated as a percentage and presented as a graphical display.

4. Results

4.1. Demographic and Clinical Characteristics

A total of 589 participants were included in the analysis. Of these, 353 (59.9%) were positive for *Helicobacter pylori*, while 236 (40.1%) tested negative based on stool antigen test (SAT) results.

Overall, *H. pylori* infection was significantly associated with burning epigastric pain that worsens on an empty stomach ($p < 0.00001$). Several other gastrointestinal symptoms were also more common in the positive group, including bloating ($p = 0.012$), persistent vomiting ($p = 0.029$), dysphagia ($p < 0.00001$), diarrhea ($p = 0.0003$), constipation ($p = 0.0001$), and melena (black, tarry

stools) ($p < 0.00001$). It is important to note that SAT results can be affected by factors such as low bacterial load or recent medication use, which may lead to false-negative findings and influence observed associations Table 1.

Table 1. Combined Results of The Prevalence of Symptoms in All the Patients Based on Negative and Positive *H. Pylori* Lab Results.

Symptoms (N=589)	Tested Negative for <i>H. pylori</i>			Tested Positive for <i>H. pylori</i>			p value
	Number of Patients Evaluated	Number of Patients with Symptom	% of patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% of patients with Symptom	
Gender	236 F (145) M (91)			353 F (206) M (147)			0.45484
Bloating	236	4	1.69%	353	21	5.95%	0.01209
Nausea	236	11	4.66%	353	29	8.22%	0.09294
Persistent Vomiting	236	6	2.54%	353	23	6.52%	0.02896
Burning Pain That Worsens When the Stomach Is Empty	236	10	4.24%	353	269	76.20%	0.00001*
Dysphagia	236	10	4.24%	353	81	22.95%	0.00001*
Unintentional Weight Loss (Over 3 kg in Past Month)	236	21	8.90%	353	47	13.31%	0.10028
Feeling of Fullness/ Loss of Appetite	236	16	6.78%	353	22	6.23%	0.79103
Diarrhea	236	10	4.24%	353	47	13.31%	0.00026
Constipation	236	6	2.54%	353	40	11.33%	0.00010
Bloody or Black Tarry Stools	236	3	1.27%	353	40	11.33%	0.00001*
Total Number of Patients Presented with Symptoms	236	83	35.17%	353	352	99.72%	0.00001*

The strength of these associations also varied across different age groups.

Burning epigastric pain that worsens on an empty stomach showed a sensitivity of 76.2% and a specificity of 95.8% for detecting *H. pylori* infection. The positive predictive value (PPV) was 96.4%, while the negative predictive value (NPV) was 72.9%. A summary of the diagnostic performance of this symptom is presented in Table 2.

Table 2. summarizes the diagnostic performance of burning epigastric pain.

Metric	Value
Sensitivity	76.2%
Specificity	95.8%
Positive Predictive Value (PPV)	96.4%

Negative Predictive Value (NPV)	72.9%
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Odds Ratio (OR) Calculation**Burning Pain That Worsens on an Empty Stomach**

Table 3:

- Positive: 269/353 → a = 269, b = 353 - 269 = 84
- Negative: 10/236 → c = 10, d = 236 - 10 = 226

$$OR = \frac{269 \cdot 226}{84 \cdot 10} = \frac{60794}{840} \approx 72.4$$

Table 3. Other Symptoms (ORs Approximate).

Symptom	a	b	c	d	OR
Dysphagia	81	272	10	226	6.7
Diarrhea	47	306	10	226	3.5
Constipation	40	313	6	230	4.9
Bloody/Black Stools	40	313	3	233	9.97

Interpretation:*4.2. Prevalence of Symptoms in H. Pylori-Positive and -Negative Patients (Table 10, Figure 2)*

Among the 589 participants, 353 were *H. pylori*-positive, and 236 were *H. pylori*-negative based on stool antigen test (SAT) results. Almost all patients in the positive group (352/353, 99.7%) reported at least one gastrointestinal symptom, compared with 83/236 (35.2%) in the negative group. This difference was statistically significant ($p < 0.00001$).

Burning epigastric pain that worsens on an empty stomach was reported in 269/353 (76.2%) of *H. pylori*-positive patients, compared with 10/236 (4.2%) in the negative group ($p < 0.00001$). Other symptoms were also significantly more frequent in infected patients, including bloating ($p = 0.012$), persistent vomiting ($p = 0.029$), dysphagia ($p < 0.00001$), diarrhea ($p = 0.0003$), constipation ($p = 0.0001$), and melena (black, tarry stools) ($p < 0.00001$). (Figure 1)

In contrast, nausea ($p = 0.093$), unintentional weight loss ≥ 3 kg within one month ($p = 0.100$), and early satiety or loss of appetite ($p = 0.791$) did not show statistically significant differences between the two groups.

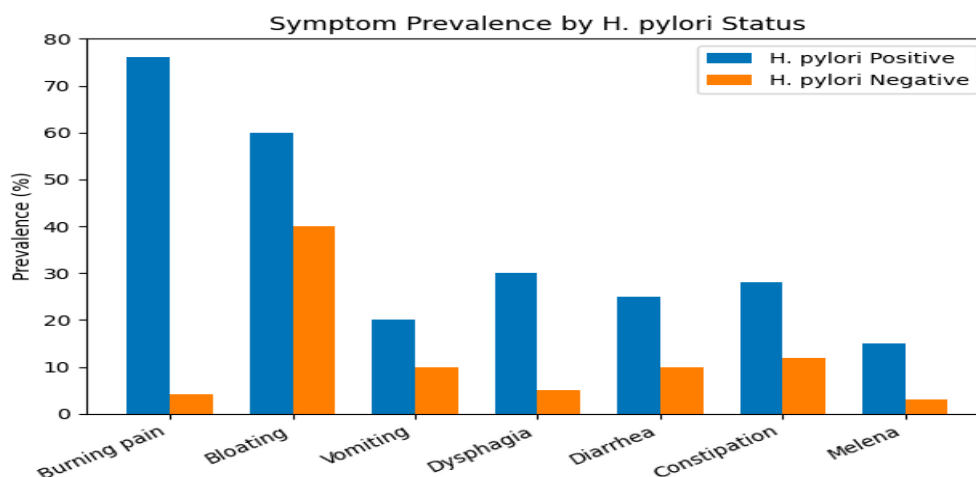


Figure 1. Prevalence of gastrointestinal symptoms in *H. pylori*-positive and negative patients.

4.3. Prevalence of *H. pylori*-Associated Symptoms Across Age Groups (Tables 4-10)

4.3.1. Age Group 18–25 Years (Table 4)

In the 18–25-year age group, 67 patients were included, of whom 33 tested positive for *H. pylori* and 34 tested negative. No significant difference in infection rates was observed between males and females ($p = 0.067$).

In this age group, burning epigastric pain that worsens on an empty stomach ($p < 0.00001$) and melena (black, tarry stools) ($p = 0.018$) were significantly associated with infection. The remaining symptoms, including bloating ($p = 1.00$), nausea ($p = 0.57$), persistent vomiting ($p = 0.54$), dysphagia ($p = 0.06$), unintentional weight loss ≥ 3 kg/month ($p = 0.96$), early satiety or loss of appetite ($p = 0.08$), diarrhea ($p = 0.96$), and constipation ($p = 0.08$), did not reach statistical significance.

Table 4. The Prevalence of Symptoms in Patients Based on Negative and Positive *H. pylori* Lab Results (Ages between 18-25).

	Tested Positive for <i>H. pylori</i>			Tested Negative for <i>H. pylori</i>			p value
	Number of Patients Evaluated	Number of Patients with Symptom	% Of Patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% Of Patients with Symptom	
Age Group 18-25							
Gender	14 (F) 19 (M)			22 (F) 12 (M)			0.06744
Bloating	33	0	0.00%	34	0	0.00%	1.00000
Nausea	33	1	3.03%	34	2	5.88%	0.57252
Persistent Vomiting	33	2	6.06%	34	1	2.94%	0.53707
Burning Pain That Worsens When the Stomach Is Empty	33	29	87.88%	34	0	0.00%	0.00001*
Dysphagia	33	7	21.21%	34	2	5.88%	0.06582
Unintentional Weight Loss (Over 3 kg in Past Month)	33	4	12.12%	34	4	11.76%	0.96411

Feeling of Fullness/ Loss of Appetite	33	0	0.00%	34	3	8.82%	0.08082
Diarrhea	33	5	15.15%	34	5	14.71%	0.95918
Constipation	33	5	15.15%	34	1	2.94%	0.08013
Bloody or Black Tarry Stools	33	5	15.15%	34	0	0.00%	0.01830
Total Number of Patients Presented with Symptoms	33	32	96.97%	34	16	47.06%	0.00001*

Table 5. The Prevalence of Symptoms in Patients Based on Negative and Positive *H. Pylori* Lab Results (Ages between 26-33).

Age Group 26-33	Tested Positive for <i>H. pylori</i>			Tested Negative for <i>H. pylori</i>			p value
	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	
Gender	31 (F) 26 (M)			20 (F) 20 (M)			0.67022
Bloating	57	2	3.51%	40	1	2.50%	0.77756
Nausea	57	3	5.26%	40	1	2.50%	0.50048
Persistent Vomiting	57	0	0.00%	40	1	2.50%	0.23016
Burning Pain That Worsens When the Stomach Is Empty	57	43	75.44%	40	3	7.50%	0.00001*
Dysphagia	57	17	29.82%	40	2	5.00%	0.00242
Unintentional Weight Loss (Over 3 kg in Past Month)	57	8	14.04%	40	4	10.00%	0.55240
Feeling of Fullness/ Loss of Appetite	57	1	1.75%	40	2	5.00%	0.36339
Diarrhea	57	5	8.77%	40	0	0.00%	0.05443
Constipation	57	5	8.77%	40	1	2.50%	0.20685
Bloody or Black Tarry Stools	57	6	10.53%	40	0	0.00%	0.03413
Total Number of Patients Presented with Symptoms	57	57	100.00%	40	13	32.50%	0.00001*

Table 6. The Prevalence of Symptoms in Patients Based on Negative and Positive *H. Pylori* Lab Results (Ages 34-41).

	Tested Positive for <i>H. pylori</i>	Tested Negative for <i>H. pylori</i>
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Age Group 34-41	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	p value
Gender	43 (F) 27 (M)			27 (F) 28 (M)			0.16777
Bloating	70	3	4.29%	55	1	1.82%	0.43652
Nausea	70	6	8.57%	55	3	5.45%	0.50337
Persistent Vomiting	70	4	5.71%	55	1	1.82%	0.26985
Burning Pain That Worsens When the Stomach Is Empty	70	48	68.57%	55	3	5.45%	0.00001*
Dysphagia	70	13	18.57%	55	3	5.45%	0.02934
Unintentional Weight Loss (Over 3 kg in Past Month)	70	8	11.43%	55	0	0.00%	0.00956
Feeling of Fullness/ Loss of Appetite	70	8	11.43%	55	3	5.45%	0.24187
Diarrhea	70	10	14.29%	55	1	1.82%	0.01459
Constipation	70	5	7.14%	55	1	1.82%	0.16685
Bloody or Black Tarry Stools	70	10	14.29%	55	0	0.00%	0.00347
Total Number of Patients Presented with Symptoms	70	70	100.00%	55	15	27.27%	0.00001*

Table 7. The Prevalence of Symptoms in Patients Based on Negative and Positive *H. Pylori* Lab Results (Ages between 42-49).

Age Group 42-49	Tested Positive for <i>H. pylori</i>			Tested Negative for <i>H. pylori</i>			p value
	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	
Gender	27 (F) 29 (M)			23 (F) 8 (M)			0.01891
Bloating,	56	3	5.36%	31	0	0.00%	0.18969
Nausea	56	6	10.71%	31	0	0.00%	0.05892
Persistent Vomiting	56	2	3.57%	31	0	0.00%	0.28710
Burning Pain That Worsen When Stomach Is Empty	56	42	75.00%	31	2	6.45%	0.00001*
Dysphagia	56	8	14.29%	31	1	3.23%	0.10475

Unintentional Weight Loss (Over 3 kg in the Past Month)	56	8	14.29%	31	5	16.13%	0.81734
Feeling of Fullness/ Loss of Appetite	56	2	3.57%	31	3	9.68%	0.24123
Diarrhea	56	8	14.29%	31	1	3.23%	0.10475
Constipation	56	7	12.50%	31	5	16.13%	0.63827
Bloody or Black Tarry Stools	56	6	10.71%	31	0	0.00%	0.05892
Total Number of Patients Presented with Symptoms	56	56	100.00%	31	11	35.48%	0.00001*

Table 8. The Prevalence of Symptoms in Patients Based on Negative and Positive *H. Pylori* Lab Results (Ages between 50-57).

Age Group 50-57	Tested Positive for <i>H. pylori</i>			Tested Negative for <i>H. pylori</i>			p value
	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% of Patients with Symptom	
Gender	48 (F) 18 (M)			25 (F) 13 (M)			0.45637
Bloating	66	8	12.12%	38	0	0.00%	0.02550
Nausea	66	4	6.06%	38	3	7.89%	0.71924
Persistent Vomiting	66	2	3.03%	38	1	2.63%	0.90687
Burning Pain That Worsens When the Stomach Is Empty	66	58	87.88%	38	0	0.00%	0.00001*
Dysphagia	66	15	22.73%	38	1	2.63%	0.00624
Unintentional Weight Loss (Over 3 kg in Past Month)	66	5	7.58%	38	4	10.53%	0.60631
Feeling of Fullness/ Loss of Appetite	66	3	4.55%	38	3	7.89%	0.48055
Diarrhea	66	8	12.12%	38	0	0.00%	0.02550
Constipation	66	8	12.12%	38	1	2.63%	0.09742
Bloody or Black Tarry Stools	66	4	6.06%	38	0	0.00%	0.12171
Total Number of Patients Presented with Symptoms	66	66	100.00%	38	13	34.21%	0.00001*

Table 9. The Prevalence of Symptoms in Patients Based on Negative and Positive *H. pylori* Lab Results (Ages between 58-65).

Age Group 58-65	Tested Positive for <i>H. pylori</i>			Tested Negative for <i>H. pylori</i>			p value
	Number of Patients Evaluated	Number of Patients with Symptom	% Of Patients with Symptom	Number of Patients Evaluated	Number of Patients with Symptom	% Of Patients with Symptom	
Gender	25 (F) 8 (M)			15 (F) 7 (M)			0.53656
Bloating,	33	0	0.00%	22	1	4.55%	0.21645
Nausea	33	3	9.09%	22	1	4.55%	0.52482
Persistent Vomiting	33	3	9.09%	22	1	4.55%	0.52482
Burning Pain That Worsen When Stomach Is Empty	33	24	72.73%	22	0	0.00%	0.00001*
Dysphagia	33	5	15.15%	22	1	4.55%	0.21645
Unintentional Weight Loss (Over 3 kg in Past Month)	33	7	21.21%	22	4	18.18%	0.78313
Feeling of Fullness/ Loss of Appetite	33	1	3.03%	22	1	4.55%	0.76870
Diarrhea	33	3	9.09%	22	1	4.55%	0.52482
Constipation	33	3	9.09%	22	1	4.55%	0.52482
Bloody or Black Tarry Stools	33	4	12.12%	22	2	9.09%	0.72397
Total Number of Patients Presented with Symptoms	33	33	100.00%	22	9	40.91%	0.00001*

4.3.2. Age Group 26–33 Years (Table 5)

Of the 97 patients aged 26–33 years, 57 were *H. pylori*-positive and 40 were *H. pylori*-negative. No statistically significant difference in infection prevalence between males and females was observed ($p = 0.67$).

Burning epigastric pain that worsens on an empty stomach ($p < 0.00001$), dysphagia ($p = 0.002$), and melena (black, tarry stools) ($p = 0.03$) were significantly associated with *H. pylori* infection in this age group. Diarrhea showed a borderline association ($p = 0.054$). Other symptoms, including bloating ($p = 0.77$), nausea ($p = 0.50$), persistent vomiting ($p = 0.20$), unintentional weight loss ≥ 3 kg within one month ($p = 0.55$), early satiety or loss of appetite ($p = 0.36$), and constipation ($p = 0.21$), were not statistically significant.

4.3.3. Age Group 34–41 (Table 6)

Among 125 patients, 70 tested positive, and 55 tested negative. No significant difference was found between males and females ($p = 0.17$). “Burning pain that worsens when the stomach is empty”

($p < 0.00001$), dysphagia ($p = 0.029$), diarrhea ($p = 0.015$), unintentional weight loss >3 kg/month ($p = 0.009$), and bloody/black tarry stools ($p = 0.003$) were significantly associated with infection. Other symptoms, including bloating ($p = 0.44$), nausea ($p = 0.50$), persistent vomiting ($p = 0.27$), feeling of fullness/loss of appetite ($p = 0.24$), and constipation ($p = 0.17$), were not significant.

4.3.4. Age Group 42–49 (Table 7)

Of 87 patients, 56 tested positive, and 31 tested negative. A significant gender difference was observed ($p = 0.018$). Only “burning pain that worsens when the stomach is empty” ($p < 0.00001$) was statistically significant. Nausea ($p = 0.0589$) and bloody/black, tarry stools ($p = 0.0589$) were more common among positive patients but did not reach statistical significance. Other symptoms, including bloating ($p = 0.19$), persistent vomiting ($p = 0.29$), dysphagia ($p = 0.10$), unintentional weight loss >3 kg/month ($p = 0.82$), feeling of fullness/loss of appetite ($p = 0.24$), diarrhea ($p = 0.10$), and constipation ($p = 0.64$), were not significant.

4.3.5. Age Group 50–57 (Table 8)

Among 104 patients, 66 tested positive, and 38 tested negative. No significant gender difference was found ($p = 0.46$). Significant symptoms included bloating ($p = 0.025$), burning pain that worsens when the stomach is empty ($p < 0.00001$), dysphagia ($p = 0.006$), and diarrhea ($p = 0.025$). Other symptoms, such as nausea ($p = 0.72$), persistent vomiting ($p = 0.91$), unintentional weight loss >3 kg/month ($p = 0.61$), feeling of fullness/loss of appetite ($p = 0.48$), constipation ($p = 0.10$), and bloody/black tarry stools ($p = 0.12$), were not significant.

4.3.6. Age Group 58–65 (Table 9)

Among 42 patients, 33 tested positive and 22 tested negative. No significant gender difference was observed ($p = 0.54$). Only “burning pain that worsens when the stomach is empty” ($p < 0.00001$) was significantly associated with *H. pylori*. Other symptoms, including bloating ($p = 0.22$), nausea ($p = 0.52$), persistent vomiting ($p = 0.52$), dysphagia ($p = 0.22$), unintentional weight loss >3 kg/month ($p = 0.78$), feeling of fullness/loss of appetite ($p = 0.77$), diarrhea ($p = 0.52$), constipation ($p = 0.52$), and bloody/black tarry stools ($p = 0.72$), were not significant.

Table 10. The Prevalence of *H. pylori*'s Most Common Symptoms in All the Different Age Groups.

Age Groups/ Presented Symptoms	18-25		26-33		34-41		42-49		50-57		58-65		>65 (66-83)		Combine d (N=589)	
	Posi ve For <i>H. pylori</i>	Ne gati ve For <i>H. pylori</i>	P osi ti ve For <i>H. pylori</i>	Ne gati ve For <i>H. pylori</i>	P osi ti ve For <i>H. pylori</i>	Ne gati ve For <i>H. pylori</i>	P osi ti ve For <i>H. pylori</i>	Ne gati ve For <i>H. pylori</i>	Posi tive For <i>H. pylori</i>	Ne gati ve For <i>H. pylori</i>	Pos itiv e For <i>H. pylori</i>	Neg ativ e For <i>H. pylori</i>	Positi ve For <i>H. pylori</i>	Neg ativ e For <i>H. pylori</i>	Posi tive For <i>H. pylori</i>	Nega tive For <i>H. pylori</i>
Bloating	0.0 0%	0.0 0%	3.51 %	2.5 0%	4.29 %	1.8 2 %	5. 36 %	0.0 0%	12.12 %*	0.00 %	0.00 %	4.55 %	13.16 %	6.2 5%	5.95 %*	1.69 %

Nausea	3.0 3%	5.8 8%	5.26 %	2.5 0%	8.57 %	5.4 5 %	10. 71 %	0.0 0%	6.06 %	7.89 %	9.09 %	4.55 %	15.79 %	6.2 5%	8.22 %	4.66 %
Persistent Vomiting	6.0 6%	2.9 4%	0.00 %	2.5 0%	5.71 %	1.8 2 %	3. 57 %	0.0 0%	3.03 %	2.63 %	9.09 %	4.55 %	13.16 %	6.2 5%	6.52 %*	2.54 %
Burning Pain That Worsens When the Stomach Is Empty	87.8 8%*	0.0 0%	75.4 4%*	7.5 0%	68.5 7%*	5.4 5 %	75. 00 %*	6.4 5%	87.88 %*	0.00 %	72.7 3%*	0.00 %	65.79 %*	12.5 0%	76.20 %*	4.24 %
Dysphagia	21. 21 %	5.8 8%	29.8 2%*	5.0 0%	18.5 7%*	5.4 5 %	14. 29 %	3.2 3%	22.73 %*	2.63 %	15.1 5%	4.55 %	42.11 %*	0.0 0%	22.95 %*	4.24 %
Unintentional Weight Loss (Over 3 kg in Past Month)	12. 12 %	11. 76 %	14.0 4%	10.0 0%	11.4 3%*	0.0 0 %	14. 29 %	16.1 3%	7.58 %	10.5 3%	21.2 1%	18.1 8%	18.42 %	18.7 5%	13.3 1%	8.90 %
Feeling of Fullness/ Loss of Appetite	0.0 0%	8.8 2%	1.75 %	5.0 0%	11.4 3%	5.4 5 %	3. 57 %	9.6 8%	4.55 %	7.89 %	3.03 %	4.55 %	18.42 %	6.2 5%	6.23 %	6.78 %
Diarrhea	15. 15 %	14. 71 %	8.77 %*	0.0 0%	14.2 9%*	1.8 2 %	14. 29 %	3.2 3%	12.12 %*	0.00 %	9.09 %	4.55 %	21.05 %	12.5 0%	13.31 %*	4.24 %
Constipation	15. 15 %	2.9 4%	8.77 %	2.5 0%	7.14 %	1.8 2 %	12. 50 %	16.1 3%	12.12 %	2.63 %	9.09 %	4.55 %	18.42 %	12.5 0%	11.33 %*	2.54 %
Bloody or Black Tarry Stools	15.1 5%*	0.0 0%	10.5 3%*	0.0 0%	14.2 9%*	0.0 0 %	10. 71 %	0.0 0%	6.06 %	0.00 %	12.1 2%	9.09 %	13.16 %	0.0 0%	11.33 %*	1.27 %
Total Number of Patients Presented with Symptoms	96.9 7%*	47. 06 %	100. 00 %*	32.5 0%	100. 00%*	27.2 7%	100. .00 %*	35.4 8%	100.00 %*	34.2 1%	100.0 0%*	40.9 1%	100.00 %*	37.5 0%	99.72 %*	35.17 %

* Indicates that there is a statistically significant association between the prevalence of the symptom and *H. pylori* positive test result.

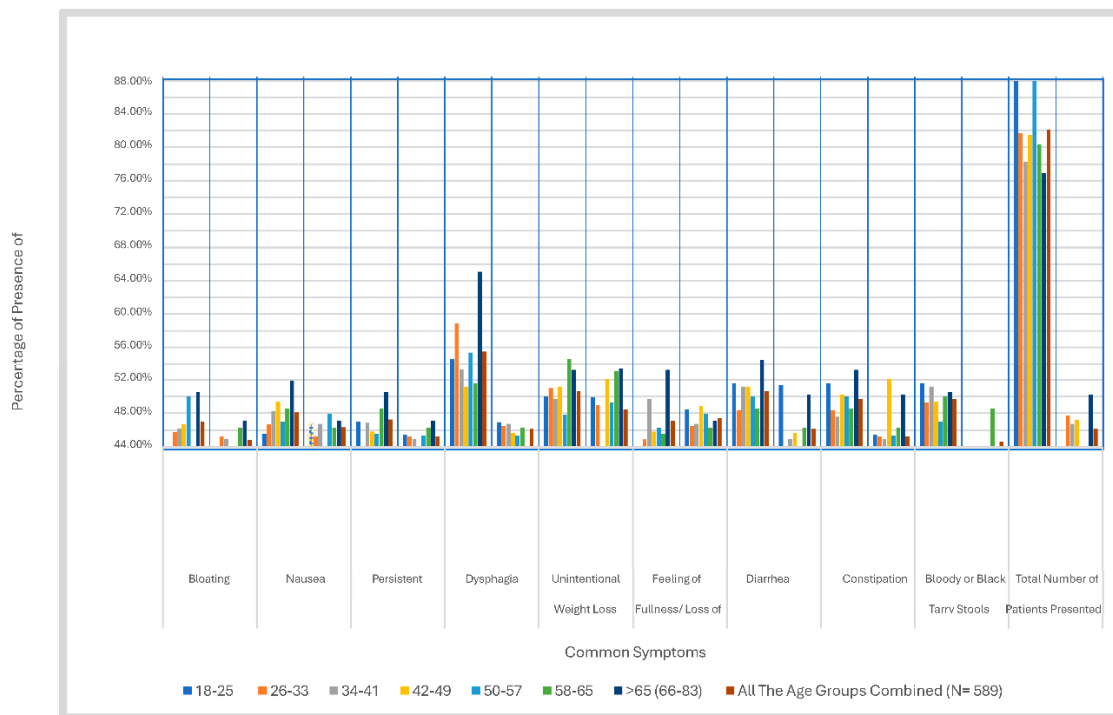


Figure 2. The Prevalence of *H. pylori*'s Most Common Symptoms in All the Different Age Groups.

5. Discussion

In this retrospective study, we examined the relationship between *Helicobacter pylori* infection and gastrointestinal symptoms in patients undergoing stool antigen testing. Several symptoms were observed more frequently in *H. pylori*-positive patients, particularly burning epigastric pain that worsened on an empty stomach. These findings are consistent with previous studies reporting an association between dyspeptic symptoms and *H. pylori* infection, although most earlier work has focused on broader symptom groups rather than on individual clinical features [15,16,21,22].

In contrast, this study placed emphasis on a single, clinically recognizable symptom and assessed both its association with infection and its practical diagnostic performance in a real-world setting. Alongside symptom prevalence, we also reported measures such as sensitivity, specificity, and predictive values. Age-based comparisons were included to describe how symptom patterns varied across different groups. Nevertheless, these findings should be viewed as observational associations rather than evidence of diagnostic accuracy.

Burning epigastric pain showed an association with *H. pylori* positivity and demonstrated high specificity (95.8%) and positive predictive value (96.4%). However, its moderate sensitivity (76.2%) and negative predictive value (72.9%) suggest that the absence of this symptom cannot reliably exclude infection. For this reason, it may be useful in raising clinical suspicion and guiding decisions about testing, but it should not be used on its own as a diagnostic tool or as a substitute for confirmatory testing [8,24].

The relatively high odds ratio for this symptom ($OR \approx 72$) should be interpreted carefully. It is likely influenced by the low frequency of the symptom among *H. pylori*-negative patients, which can exaggerate effect estimates in retrospective studies. In addition, the study population consisted of individuals already referred for testing, which may have further strengthened the observed association. As such, this result reflects a strong association within a selected clinical population rather than a generalizable risk estimate.

It is also important to recognize that burning epigastric pain is not specific to *H. pylori* infection. Similar symptoms can be seen in conditions such as peptic ulcer disease, gastroesophageal reflux disease, functional dyspepsia, cardiac ischemia, and pancreatic disorders. Therefore, clinical symptoms alone cannot reliably distinguish *H. pylori* infection from other underlying causes without appropriate diagnostic testing [8,24].

Other symptoms, including dysphagia, diarrhea, constipation, and melena, were also more frequently reported in *H. pylori*-positive patients, supporting previous observations that infected individuals may present with a higher symptom burden [21,22]. Differences across age groups further suggest that clinical presentation may vary depending on patient characteristics and should be interpreted in context.

Several limitations should be considered when interpreting these results. The retrospective design limited control over data quality and introduced the possibility of incomplete or inconsistent documentation. In addition, the study population consisted only of patients referred for testing, which may introduce selection bias and limit generalizability [3,10]. Symptom data were also extracted from routine clinical records rather than standardized assessment tools.

Another limitation is that stool antigen testing was the sole diagnostic method used. Although it is widely accepted and non-invasive, its accuracy may be lower than that of urea breath testing in some settings. Without confirmatory testing, there is a possibility of misclassification, particularly false-negative results. Factors such as low bacterial load or recent use of certain medications may also reduce test sensitivity, meaning that some infected patients may have been classified as negative [8,10].

In addition, detailed information regarding the assay characteristics, such as whether monoclonal or polyclonal antibodies were used, was not available. This may have introduced some variability in diagnostic performance and should be considered when interpreting the findings.

The statistical analysis was also limited to univariate methods. Since multivariate analysis was not performed, potential confounding factors such as age, sex, and comorbidities could not be adjusted for [3,10]. Future studies should address this using more robust statistical models.

Socioeconomic and environmental variables, including sanitation, household crowding, and access to healthcare, were not available in the dataset and therefore could not be evaluated. These factors are known to influence *H. pylori* infection rates and may contribute to residual confounding [21,23].

Although patients were grouped by age, these categories were used for descriptive purposes rather than based on a formal statistical framework, which may limit the interpretation of age-related trends.

Overall, this study should be viewed as an observational analysis of symptom patterns rather than a diagnostic validation study. Burning epigastric pain that worsens on an empty stomach may help increase clinical suspicion and support more targeted testing, particularly in resource-limited settings, but it should not replace established diagnostic approaches [8,24].

Future prospective multicenter studies with standardized symptom assessment, multivariate analysis, and multiple diagnostic methods are needed to confirm and expand on these findings.

6. Conclusions

This study found a clear link between burning epigastric pain that worsens on an empty stomach and *Helicobacter pylori* infection in a selected group of patients who underwent stool antigen testing. The symptom showed high specificity and a strong positive predictive value, but its moderate sensitivity means that many infected patients may not present with it, so its absence cannot rule out infection.

Taken together, these findings suggest that certain symptom patterns can still be helpful in everyday clinical practice by raising suspicion and guiding clinicians in deciding who may benefit from testing. At the same time, symptoms on their own are not enough to make a diagnosis and

should not replace standard diagnostic methods. Current guidelines still support a test-and-treat approach to ensure accurate diagnosis and proper management of *H. pylori*.

If symptoms are used alone, there is a real risk of missing infections or making incorrect clinical decisions, which may also lead to unnecessary treatment and contribute to antibiotic resistance. For this reason, the results of this study should be seen as supportive information that can assist clinical judgment, not as a diagnostic tool by itself.

More well-designed prospective studies, with consistent symptom recording and multiple validated diagnostic tests, are needed to confirm these findings and better understand how symptom-based assessment can be used in practice.

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