Hilmi *et. al.* Babcock Univ. Med. J.2025 8(1):251-256
https://doi.org/10.38029/babcockuniv.med.j..v8i1.595

BUMJ A Multi-Disciplinary Medical Journal
eISSN: 2756-4657

RESEARCH ARTICLE OPEN ACCESS

Prevalence of *H. Pylori* in gastric biopsy specimens with the histopathological assessment of gastric mucosa between 2015 and 2023: A cross-sectional study

Hilmi MN[1ID], Mahdi BM[2ID], Alqirbi HIA[2ID]

[1]*Department of Pathology and Forensic Medicine, Al-Kindy College of Medicine, University of Baghdad, Baghdad, Iraq*
[2]*HLA Research Unit, Department of Microbiology, Al-Kindy College of Medicine, University of Baghdad, Baghdad, Iraq*
[3]*Department of Microbiology, Al-Kindy College of Medicine, University of Baghdad, Baghdad, Iraq*

Submitted: 11th September 2024
Accepted: 21st March 2025
Published: 30th June 2025
ID: Orcid ID

Abstract
Background: *Helicobacter pylori (H. pylori)* is a gram-negative aerobic bacterium that primarily inhabits the stomach mucosa and is the leading cause of gastric atrophy and cancer. This study will detect the prevalence of *H pylori* infection with its combined effect on histopathological changes between 2015 and 2023.
Methods: A cross-sectional study was conducted on 400 patients who complained of upper gastrointestinal symptoms and underwent upper oesophageal gastroduodenal endoscopy at Al-Kindy Teaching Hospital from January 2015 to August 2023. A gastric mucosal biopsy was performed during endoscopy, and histopathological examination was done using haematoxylin and eosin stain and modified Giemsa stain to increase the specificity of the test.
Results: This study analysed 400 patients who complained of dyspepsia, with a mean age of 44.77±15.95. Of these patients, 51% were male and 49% were female. The prevalence of *H pylori* in the gastric mucosa was 25%, while the remaining patients tested negative. The histopathological analysis showed significant differences between patients with H pylori-induced gastritis and those without, regarding mucous-secreting epithelial cells (10% vs. 92%), intact mucosal glands (76% vs. 10.66%), and gastric atrophy (52% vs. 8%), respectively.
Conclusions: This study confirms that the prevalence of H. pylori infection is a significant cause of gastritis, especially the atrophic type, and is common in patients over 40 years old of both sexes. Therefore, we recommend that patients over 40 years old with chronic dyspepsia undergo upper endoscopy and gastric biopsy to reduce the risk of gastric atrophy and cancer.

Keywords: H Pylori, Gastric, Infection

Plain English Summary

Helicobacter pylori (H. pylori) is a gram-negative aerobic bacterium that primarily inhabits the gastric mucosa and causes gastric atrophy and cancer. The prevalence of H. pylori infection is a significant cause of gastritis, especially the atrophic type, and is common in patients over 40 years of both sexes. Therefore, we recommend that patients over 40 years old with chronic dyspepsia undergo upper endoscopy and gastric mucosal biopsy to reduce the risk of gastric atrophy and cancer.

Background

Helicobacter pylori (H. pylori) infection causes chronic mucosal gastritis that can progress to severe mucosal pathologies depending on the virulence of the bacteria, the immunity of the host, and other environmental factors, leading to

Correspondence:
Mahdi, Batool M
HLA Research Unit, Department of Microbiology, Al-Kindy College of Medicine,
University of Baghdad
Baghdad, Iraq
+9647702553215, batoolmutar@kmc.uobaghdad.edu.iq

© BUMJ. 2025 Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.

different diseases such as peptic ulcer, cancer, and gastric mucosa-associated lymphoid tissue lymphoma (1). H. pylori was first cultured in 1983 and described as a urease-negative bacterium (2). It is prevalent globally and affects about half of the world's population, with its prevalence varying according to the sanitation standards of the area. In developing countries, its prevalence rate is about 80-90%, while in developed countries, it is about 40-50% (3). The mode of transmission is either faeco-oral or oral-oral routes (4). These bacteria produce the urease enzyme that converts urea to ammonia and carbon dioxide, and ammonia changes the acidity of the stomach to an alkaline environment, which is suitable for the bacteria to live in the stomach. They also produce cytotoxin-associated gene A (Cag A) and vacuolating cytotoxin A (Vac A), which affect the integrity of the mucosa, leading to inflammation and ulceration (5). Invasive endoscopy with biopsy taking is used in the diagnosis of *H. pylori* infection, which is classified into acute and chronic (6, 7). *H.* pylori-associated gastritis is characterised by the presence of acute and chronic inflammatory features, with immature surface epithelial cells (8). Mucus degeneration also occurs due to the successful cell renewal of epithelial cells (9). H. pylori can be diagnosed by histopathology of gastric mucosa biopsy, which has high sensitivity and specificity (10). Additionally, it provides information about the degree of inflammation, atrophic gastritis, and/or intestinal metaplasia (11, 12).

This study will assess the prevalence of *H pylori* infection with histopathological changes between 2015 and 2023 in discrete areas in Baghdad.

Materials and Methods

A cross-sectional study was conducted on 400 patients who presented with dyspepsia and other upper gastrointestinal symptoms. They underwent upper oesophageal gastroduodenal endoscopy at Al-Kindy Teaching Hospital in a discrete area of Baghdad, Iraq, from January 2015 to August 2023. The study was approved by the Ethical and Scientific Committee of Al-Kindy Teaching Hospital and the Ethical and Scientific Committee of Al-Kindy College of Medicine. Inclusion criteria were patients presenting with gastric symptoms such as upper gastric pain, dyspepsia, and heartburn, while exclusion criteria included patients with a history of gastric cancer. Demographic data, including age and gender, were collected from the patients. During endoscopy, a gastric mucosal biopsy was taken from different sites of the stomach including the lesser and greater curvatures of the antrum, approximately two to three centimetres from the pylorus; the lesser curvature of the corpus, about four centimetres near the angulus; the middle portion of the greater curvature of the corpus, approximately eight centimetres from the cardia; and the incisura angularis (13). The biopsies were subjected to histopathological examination using haematoxylin and eosin (H&E) stain and modified Giemsa stain to increase the specificity of the test for direct examination of H. pylori bacteria under an ordinary microscope (11, 14). A blinded examination of these biopsies was conducted.

Statistical analysis

The data were analysed using SPSS version 26. Descriptive statistics, including frequencies and percentages, were calculated. The Independent-Sample Chi-Square Test was used to analyse related categorical variables. A p-value equal to or less than 0.05 was considered statistically significant.

Results

This cross-sectional study analysed 400 patients who complained of dyspepsia and other gastric symptoms. The mean age was 44.77±15.95. About 37% of patients were less than 40 years old, and 63% were over 40, as shown in Figure 1.

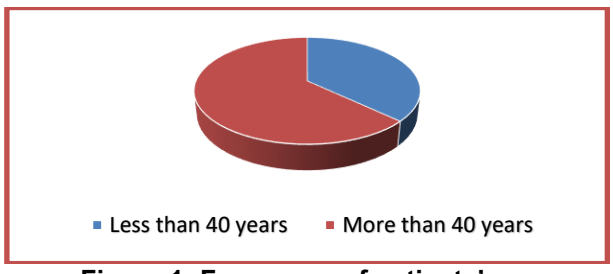


Figure 1: Frequency of patients' age

Regarding sex distribution, 51% were males and 49% were females, as illustrated in Figure 2.

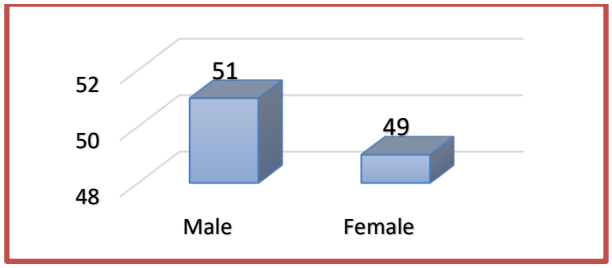


Figure 2: Sex percentage distribution (NS: not significant)

Grossly, the gastric mucosal biopsy showed multiple tiny soft white tissues in aggregates that were 0.5cm. After staining with a modified Giemsa stain, the prevalence of H. pylori in the gastric mucosa was 25%, while the rest were negative for these bacteria, as shown in Figures 3 and 4.

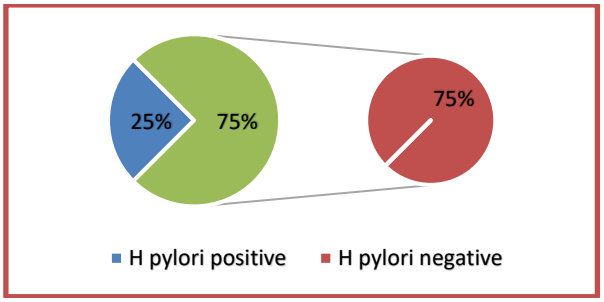


Figure 3: Prevalence of H. pylori in gastric biopsies

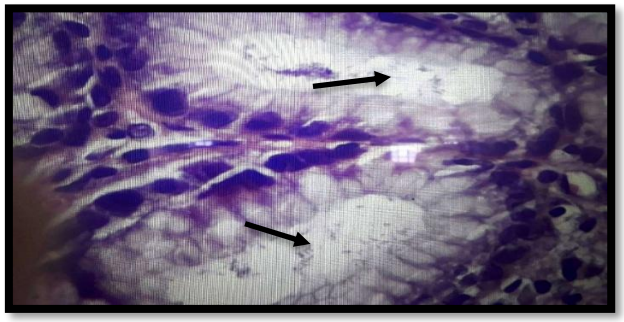


Figure 4- gastric pits show numerous curved bacilli in their lumen (arrows), consistent with *H pylori*. (H&E stain, 40x)

The biopsies were taken from the antrum or fundus and stained with H&E stain. The histopathological changes after staining demonstrated a significant difference between gastritis with and without H. pylori regarding mucous-secreting epithelial cells (10% vs. 92%), intact mucosal glands (76% vs. 10.66%), and gastric atrophy (52% vs. 8%), respectively, as shown in Table 1 and Figure 5.

Table 1: Histopathological changes in gastric biopsy

Histopathological features	H pylori (+) No.= 100		H pylori (-) No.=300		P- value
	No.	%	No.	%	
Biopsy from the body or fundus	100/100	100.0	300/300	100.0	NS
Biopsy from the Antrum or pylorus	100/100	100.0	300/300	100.0	NS
Preserved mucous-secreting epithelium	10/100	10.00	276/300	92.00	0.000
Lamina propria shows lymphoplasmacytic inflammatory cell infiltration, lymphocytes, plasma cells and polymorphs cells	100/100	100	300/300	100	NS
Mucosal glands look intact	76/100	76.00	32/300	10.66	0.000
Chronic gastritis	100/100	100.0	300/300	100.0	NS
Gastric atrophy	52/100	52.00	24/300	8.00	0.000

Metaplasia of goblet cells	8/100	8.00	20/300	6.66	NS
Dysplasia	4/100	4.00	8/300	2.66	NS
Malignancy	0/100	0.00	4/300	1.33	NS

(NS=Not significant)

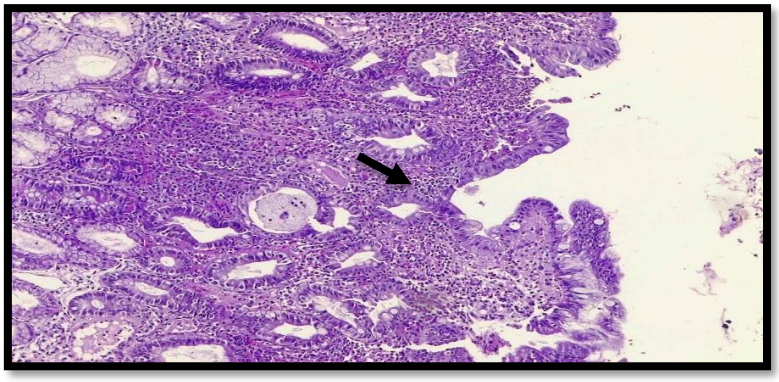


Figure 5: gastric mucosa shows changes of active chronic atrophic gastritis (arrow) (H&E stain, 10×)

Discussion

Mucosal damage in the stomach occurs in patients with *H. pylori* due to the vacuolating toxin encoded by the VacA gene, which injures epithelial cells. Biopsies were taken from the antrum or fundus, with antral biopsies being more accurate in diagnosis (15). This study found that H. pylori constituted 25% of the causative causes of chronic gastritis and gastric atrophy when stained with a modified Giemsa stain. There was no significant difference regarding gender, while it was more common in individuals over forty years old (63%). This agrees with other studies that demonstrated a lower prevalence of H. pylori infection in younger people, high-income countries, or high levels of health reporting (16). The histopathology showed lamina propria infiltrated with lymphoplasmacytic inflammatory cells, lymphocytes, plasma cells, and polymorphs cells infiltration with lymphocyte aggregation, whether the cause was H. pylori or not (Table 1). This agrees with another study done by Wang et al. 2014 (17), which reported that H. pylori stimulate many hits on the mucosa of the stomach, ending with chronic gastritis, ulcer, cancer, and gastric mucosa-associated lymphoid tissue lymphoma via interactions among host, bacterial, and environmental factors. The prevalence of H. pylori in this study was 25%, which is lower than another study that showed the global frequency of H. pylori decreased from 58.2% in (1980-1990) to 43.1% in (2011-2022) (3). In Turkey, the prevalence of H. pylori was 65% (18), while in the Dominican Republic, it was 58.9%, and peptic ulcer was 82.6% (19). In another study done in Iraq, the prevalence was 33.33%, which is comparable to this study (20), while another study demonstrated the frequency of H. pylori was 92% in atrophic gastritis (21). These differences among studies may be due to the sample size, stage of the disease, method of diagnosis of H. pylori, like invasive and non-invasive methods, age of the patients, geographical area of the study, site of the biopsy from the stomach, different social habits like smoking, alcohol, ingestion of spicy food, ingestion of drugs (22). Thus, endoscopy is a simple, rapid, cheap, excellent, and invasive method used in clinical training for detecting these bacteria and providing further information about the state of the gastric mucosa. The most important factor in reducing the frequency of this infection is the improvement in the socioeconomic status of the community and standard of living, and interrupting the route of transmission of these bacteria (23).

Conclusion

This study confirms that Helicobacter pylori infection is a significant etiological factor in gastritis, particularly the atrophic type, and is commonly observed in individuals over 40 years of age across both sexes. Based on these findings, we recommend that patients aged 40 years and above presenting with chronic dyspepsia undergo upper gastrointestinal endoscopy with gastric biopsy. This approach may facilitate early detection and management, thereby reducing the risk of progression to gastric atrophy and malignancy.

List of Abbreviation

H pylori: Helicobacter pylori

Declarations

Ethics approval and consent to participate

The study was approved by the scientific and ethics committee at the Al-Kindy College of Medicine at Baghdad University, Iraq (No. 10).

Consent for Publication

All the authors gave consent for the publication of the work under the Creative Commons Attribution Non-Commercial 4.0 license.

Availability of Data

Data for this work is available from the authors and may be provided upon reasonable request.

Conflicts of Interest

None.

Funding

None.

Authors' contributions

MBM wrote the initial draft, collected data, and conducted statistical analysis. MS edited the paper. MM reviewed the final article. AHIA wrote the initial draft and conducted statistical analysis. All authors read and approved the final manuscript.

Acknowledgment

The authors appreciate the help of all staff of the histopathology department.

References

1. Malfertheiner P, Camargo MC, El-Omar E, Liou J, Peek R, Schulz C, Smith SI, Suerbaumet S. Helicobacter pylori infection. Nat Rev Dis Primers. 2023;9(1):19. https://doi.org/10.1038/s41572-023-00431-8
2. Patel SK, Pratap CB, Jain AK, Gulati AK, Nath G. Diagnosis of Helicobacter pylori: what should be the gold standard? World journal of gastroenterology: WJG. 2014 Sep 28;20(36):12847. https://doi.org/10.3748/wjg.v20.i36.12847
3. Li Y, Choi H, Leung K, Jiang F, Graham DY, Leung WK. Global prevalence of Helicobacter pylori infection between 1980 and 2022: a systematic review and meta-analysis. Lancet Gastroenterol Hepatol. 2023;8(6):553-564. https://doi.org/10.1016/S2468-1253(23)00070-5
4. Duan M, Li Y, Liu J, Zhang W, Dong Y, Han Z, Wan M, Lin M, Lin B, Kong Q, Ding Y. Transmission routes and patterns of Helicobacter pylori. Helicobacter. 2023 Feb;28(1):e12945. https://doi.org/10.1111/hel.1294
5. Karthikeyan R, S Sundaravadanan B. Rapid urease test vs histopathological examination: a prospective study to compare the accuracy of both tests in the diagnosis of Helicobacter pylori. https://doi.org/10.9734/jpri/2021/v33i49B33369
6. AbuTaleb AM, El-Latif A, Randa S, Ahmed HA, El-Hady A, Amina A. Diagnosis of Helicobacter pylori infection by invasive and non-invasive methods: a comparative study. Egyptian Journal of Medical Microbiology. 2018 Jan 1;27(1):35-42. https://doi.org/10.21608/ejmm.2018.285135
7. Azer SA, Awosika AO, Akhondi H. Gastritis. In: StatPearls. Treasure Island (FL): StatPearls Publishing; July 19, 2023.
8. Adu-Aryee NA, Aabakken L, Dedey F, Nsaful J, Kudzi W. Comparison of endoscopic-based diagnosis with Helicobacter urease test for Helicobacter pylori infection. BMC research notes. 2016 Dec;9:1-6. https://doi.org/10.1186/s13104-016-2237-6
9. Njoroge SK. Helicobacter pylori Diagnosis, Virulence Genes, Resistance to Conventional Antibiotics and Antimicrobial Activity of Selected Medicinal plants on Isolates obtained from Patients undergoing Endoscopy at Aga Khan University Hospital, Kenya (Doctoral dissertation, JKUAT-COHES https://doi.org/10.9734/jammr/2019/v29i1230147
10. Aboud RS & Qasim HS. Impact of Helicobacter pylori on Some Blood Parameters Changes of Iraqi Patients with Gastritis Disease. Iraqi Journal of Biotechnology, 2023, Vol. 22, No. 1, 25-30.
11. Alewi MD, Mohammed AT. Evaluation of Periodontal Status among Patients with Helicobacter Pylori and Determination of Salivary PH, Flow Rate, and Alkaline Phosphatase Level. Al-Kindy Col. Med. J 2024;20(2):130-4. https://doi.org/10.47723/jxnybz47
12. Braden B. Rational Testing Diagnosis of Helicobacter pylori infection. British Medical Journal. 2012 Feb 24;344. https://doi.org/10.1136/bmj.e828
13. Konakli H, Konakli Z, GÖKSU A. Comparison of the Helicobacter pylori diagnosis methods with analytic network process. TEM Journal. 2015 Nov 1;4(4):396. https://doi.org/10.18421/TEM44-12
14. Lee JY, Kim N. Diagnosis of Helicobacter pylori by invasive test: histology. Annals of translational medicine. 2015 Jan;3(1):10.
15. Lee HC, Huang TC, Lin CL, Chen KY, Wang CK, Wu DC. Performance of routine Helicobacter pylori invasive tests in patients with dyspepsia. Gastroenterology Research and Practice. 2013;2013(1):184806. https://doi.org/10.1155/2013/184806

16. Usui Y, Taniyama Y, Endo M, Koyanagi YN, Kasugai Y, Oze I, Ito H, Imoto I, Tanaka T, Tajika M, Niwa Y. Helicobacter pylori, homologous-recombination genes, and gastric cancer. New England Journal of Medicine. 2023 Mar 30;388(13):1181-90. https://doi.org/10.1056/NEJMoa2211807
17. Wang F, Meng W, Wang B, Qiao L. Helicobacter pylori-induced gastric inflammation and gastric cancer. Cancer letters. 2014 Apr 10;345(2):196-202. https://doi.org/10.1016/j.canlet.2013.08.016
18. Bilman FB, Özdemir M, Baysal B, Kurtoğlu MG. Prevalence of H. pylori in gastric biopsy specimens in the southeastern region of Turkey. The Journal of Infection in Developing Countries. 2016 Nov 24;10(11):1177-82. https://doi.org/10.3855/jidc.6690
19. Shiota S, Cruz M, Abreu JA, Mitsui T, Terao H, Disla M, Iwatani S, Nagashima H, Matsuda M, Uchida T, Tronilo L. Virulence genes of Helicobacter pylori in the Dominican Republic. Journal of Medical Microbiology. 2014 Sep;63(9):1189-96. https://doi.org/10.1099/jmm.0.075275-0
20. Ali MK. The Isolation and Identification of H. pylori among Iraqi patients with chronic gastric inflammation. Journal of the Faculty of Medicine, Baghdad. 2022 Jul 24;64(2):102-8. https://doi.org/10.32007/jfacmedbagdad.6421929
21. AL-Hadithi HS. Association between Helicobacter pylori infection & atrophic gastritis. Journal of the Faculty of Medicine Baghdad. 2006;48(4):461-2.
22. Mohsun NE, al-Hadithi RH. The Role of ELISA test in the diagnosis of helicobacter pylori infection. Journal of the Faculty of Medicine Baghdad. 2011 Oct 2;53(3):311-3. https://doi.org/10.32007/jfacmedbagdad.533836
23. Katelaris P, Hunt R, Bazzoli F, Cohen H, Fock KM, Gemilyan M, Malfertheiner P, Mégraud F, Piscoya A, Quach D, Vakil N. Helicobacter pylori World Gastroenterology Organization Global Guideline. Journal of Clinical Gastroenterology. 2023 Feb 1;57(2):111-26. https://doi.org/10.1097/MCG.0000000000001719