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Original article

Prevalence of *H. pylori* Infection among Patients with Chronic Gastric Symptoms and The Role of Gastric Biopsy in its Diagnosis and Management

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ABSTRACT

Background and aims. *Helicobacter pylori (H. pylori) infection is a common bacterial infection that affects people worldwide. It is estimated that over half of the global population is infected with H. pylori. Complications associated with H. pylori infection include dyspepsia, heartburn, and peptic ulcer disease, and many studies showed that H. pylori-positive patients have a high risk of developing gastric cancer. Therefore, it is crucial to accurately diagnose and manage H. pylori infection, particularly among patients with gastric symptoms, through effective methods such as upper gastrointestinal tract endoscopy which this study aimed to prove.* ***Methods.*** *Over fourteen months, 256 endoscopic biopsies from patients with gastric symptoms were included. Endoscopic abnormalities, histological diagnosis of H. pylori, and histopathological findings of gastric antrum biopsies were recorded and then analyzed using SPSS.* ***Results.*** *About 217 of the total patients have positive H. pylori bacterium in stained samples. Females were infected with bacteria at a rate of 65%, while males were infected at a rate of 34%. The result has shown that the age group (29-56 years old) is the most affected, accounting for 50% of all positive infected individuals. On the other hand, the study found a highly significant relationship between H. pylori infection and endoscopic abnormalities, with a p-value < 0.001. Finally, for a total of 256 endoscopic samples, the histopathological results were 43.8% for chronic gastritis and 56.2% for chronic active gastritis.* ***Conclusion.*** *Gastric biopsy is an invasive test that is used in the diagnosis of H. pylori bacterial infection and its associated conditions such as peptic ulcer, as well as, it can help monitor disease progression.*

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INTRODUCTION

Helicobacter pylori (H. pylori) is a Gram-negative, microaerobic human pathogen that has been linked to a variety of gastroduodenal diseases. This bacterium is a spiral-shaped microbe that can colonize the mucosal layer of the stomach, causing inflammation and damage to the stomach lining [1]. H. pylori can cause gastritis, which is the inflammation of the stomach lining, through several mechanisms. Firstly, H. pylori secrete toxins that can damage the stomach lining, leading to inflammation. Secondly, the bacterium's unique ability to survive in the harsh acidic environment of the stomach enables it to induce an immune response, contributing to chronic inflammation and gastritis. Additionally, H.

pylori can disrupt the protective mucus layer of the stomach, making it more susceptible to damage from stomach acid and further promoting inflammation and gastritis [2]. In some cases, H pylori can lead to serious complications such as chronic active gastritis, peptic ulcer disease, atrophic gastritis, and even stomach cancer [3].

H. pylori is a prevalent health concern, affecting more than half of the global population and in particular regions such as Africa where the prevalence can reach up to 70%, and H. pylori is affecting even more people with asymptomatic infections [4]. It has also been observed that infection with H. pylori increases in prevalence with advancing age. Furthermore, certain strains of H. pylori are more virulent than others, increasing the likelihood of developing complications such as peptic ulcers, gastritis, and even gastric cancer [5]. The presence of coexisting conditions like gastroesophageal reflux disease (GERD) and chronic use of nonsteroidal anti-inflammatory drugs (NSAIDs) can also exacerbate H. pylori-related complications. Therefore, even though successful eradication of H. pylori through antibiotic treatment is possible, various factors can contribute to recurrent infections and relapses [6].

H. pylori infection can be diagnosed through various diagnostic tests, which are usually divided into invasive (endoscopic-based) and noninvasive tests [7]. Invasive diagnostic tests include endoscopic images, histology, rapid urease tests, culture, and molecular methods. Non-invasive diagnostic tests included 13C-urea breath test, stool antigen test, and serological, and molecular examinations [8].

Gastric biopsy is an important diagnostic tool in the diagnosis and management of H. pylori. Gastric biopsy allows for a direct examination of the stomach lining and provides the most accurate diagnosis of H. pylori infection [9]. It helps determine if the bacterium is present in the stomach, as well as the severity of the infection. Additionally, a gastric biopsy can help identify associated conditions such as gastritis, gastric ulcers, gastritis-related complications, and even gastric cancer. This information plays a crucial role in determining the appropriate treatment plan and guiding treatment decisions [10].

The biopsy can help guide the choice of treatment for H. pylori infection. It helps determine if antibiotic therapy is necessary, which antibiotics are most effective, and for how long treatment should be administered. This personalized approach ensures optimal treatment outcomes [11]. After initiating treatment, a gastric biopsy can be repeated to assess the response to therapy which helps evaluate the effectiveness of the treatment and identifies cases of treatment failure or recurrence. This enables adjustments to be made in the treatment regimen if necessary [10]. Therefore, it is crucial to accurately diagnose and manage H. pylori infection, particularly among patients with gastric symptoms through using gastroscopy.

METHODS

During fifteen months, from June 2022 to August 2023, a total of 256 patients were included in this study. These patients had chronic gastric symptoms and they attended the gastroenterology clinic of the Saray Salam Diagnostic Center in Tripoli City, Libya for gastroscopy. Among 256 patients, there were 164 female and 92 male patients, aged between 01–87 years old.

Following gastroscopy, biopsy samples were taken from the gastric antrum to detect the presence of H. pylori bacterium by using Hematoxylin and eosin stains, as well as, the histopathological changes of gastric mucosa. The data of endoscopic abnormalities, the presence of H. pylori, and the histopathological findings were determined for all patients and analyzed using SPSS.

RESULTS

The effect of gender on H. pylori infection

Table 1 presents the distribution of Helicobacter pylori infection prevalence by gender. According to the data, out of the total 256 individuals, 217, 142 (65.4%) females and 75 (34.6%) males tested positive for H. pylori infection. On the other hand, 22 (56.4%) females and 17 (43.6%) males tested negative for the infection. Overall, the table suggests that a higher proportion of females tested positive for H. pylori infection compared to males.

Table 1. Distribution by gender of the prevalence of H. pylori infection

Helicobacter pylori	Male %		Female%		Total%
	Freq	%	Freq	%	
Present (+ve)	75	34.6%	142	65.4%	217
No present (-ve)	17	43.6%	22	56.4%	39
Total	92	35.9%	164	64.1%	256

The effect of age on H. pylori infection

Table 2 provides the age distribution of individuals with Helicobacter pylori infection. According to the data, out of the total 217 individuals with H. pylori infection, the highest number (57) falls within the age group of 43-56, accounting for 26.3% of the infected population. The age group of 29-42 follows closely with 52 cases (23.9%), and the age group of 15-28 has 41 cases (18.9%). On the other hand, among the 39 individuals who tested negative for H. pylori infection, the age group of 57-70 has the highest number of cases (13), accounting for 33.3% of the non-infected population. The age group of 43-56 follows with 13 cases (15.4%), and the age group of 1-14 has the lowest number of cases with 4 (10.3%). These results suggest that the age group of 43-56 has the highest prevalence of H. pylori infection, while the age group of 57-70 has the highest proportion of individuals without the infection.

Table 2. Age distribution of Helicobacter pylori

Age group	Helicobacter pyloric	
	Positive	Negative
1 – 14	14(6.5%)	4(10.3%)
15 – 28	41(18.9%)	2(5.1%)
29 – 42	52(23.9%)	6(15.4%)
43 – 56	57(26.3%)	13(33.3%)
57 – 70	37(17.1%)	13(33.3%)
71 or older	16(7.3%)	1(2.6%)
Total %	217(100%)	39(100%)

Association between endoscopic abnormalities with Helicobacter pylori

Table 3 presents the association between endoscopic abnormalities and the presence or absence of Helicobacter pylori (H. pylori) infection. In the group with H. pylori infection (positive), 18 out of 217 patients (8.3%) had endoscopic abnormalities, while 199 patients (91.7%) did not have any abnormalities. In the group without H. pylori infection (negative), only 1 out of 39 patients (2.7%) had endoscopic abnormalities, while 38 patients (97.4%) did not have any abnormalities. The p-value, which measures the statistical significance of the association, is reported as less than 0.001, indicating a highly significant relationship between H. pylori infection and the presence of endoscopic abnormalities.

Table 3. Association between endoscopic abnormalities with Helicobacter pylori

Helicobacter pylori	Endoscopic abnormalities			*p value*
	Present (%)	Absent (%)	Total (%)	
Positive	18 (8.3 %)	199 (91.7 %)	217 (100%)	< 0.001*
Negative	1(2.7%)	38(97.4%)	39(100%)	

Histopathological findings

According to the data in table 4, out of the total 256 cases, 112 (43.8%) were diagnosed with chronic gastritis, while 144 (56.2%) were diagnosed with chronic active gastritis. These results indicate that chronic active gastritis is the more prevalent histopathological finding among the cases examined, accounting for a slightly higher percentage compared to chronic active gastritis. Figure (1a) shows the normal gastric mucosa; however, figures (1b&c) show the chronic active gastritis and chronic gastritis in some of the patients.

Table 4. Histopathological findings of 253 cases

Histopathological findings	Number	%
Chronic gastritis	112	43.8 %
Chronic active gastritis	144	56.2 %

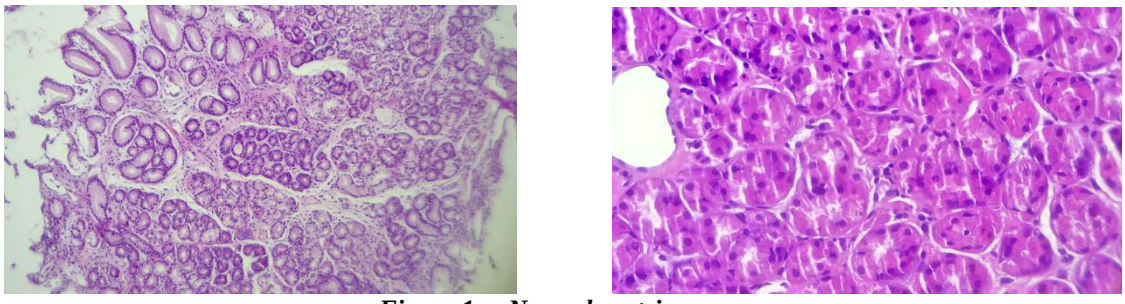

Figure 1a. Normal gastric mucosa

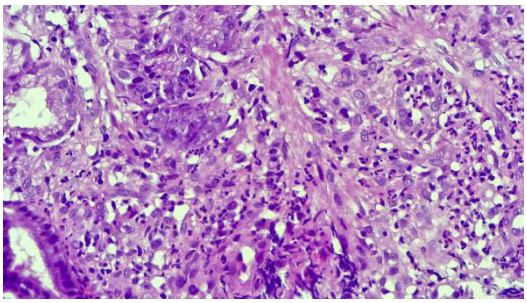

Figure 1b. Severe chronic active gastritis

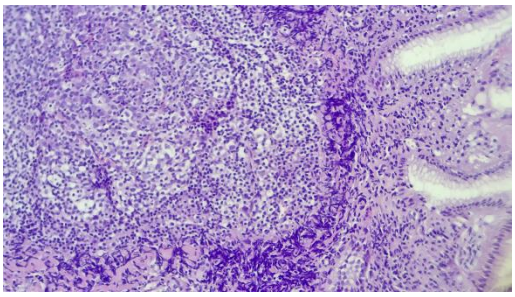

Figure 1c. Severe chronic gastritis

DISCUSSION

More than half of the adult population globally is infected with H. pylori, although the incidence varies greatly by geographic location, age, race, and socioeconomic position. In general, the prevalence of H. pylori infection is higher in developing countries compared to industrialized ones. This is especially true in Africa, where the prevalence of H. pylori infection is reported to be as high as 79.1% according to available data [12]. Furthermore, the prevalence of H. pylori infection globally is relatively similar between genders, with approximately 42.7% in women and 46.3% in men [13]. This study has found that 217 patients, about 84.8%., were infected by H. pylori from a total of 256 patients who attended the Gastroenterology clinic of the Saray Salam Diagnostic Center. Those patients have chronic gastric symptoms such as heartburn and chronic epigastric pain.

According to the result of this study, the age group of (43-56) had the highest incidence accounting for 26.3% of the infected population, followed by the age group of (29-42) with 23.9%. Overall, the result has shown an increase in the incidence of infected cases by increasing the age to 57 years old and older where the rate of infection is decreased. Accordingly, many studies have found that H. pylori infection can affect individuals of all ages. However, there is a direct relationship between increasing age and prevalence of H. pylori infection within a population [14]. For example, middle-aged adults in many developing countries have a prevalence rate higher than 80%, while industrialized countries tend to have rates ranging from 20-50%. This difference in prevalence rates can be attributed to various factors such as ethnicity, socioeconomic status, and methods of diagnosis and eradication therapy [15].

The diagnosis of H. pylori is the first correct step in its management to prevent its complications. Diagnostic tests for H. pylori can be divided into invasive tests and non-invasive tests [16]. The non-invasive tests are not always reliable and a significant portion of individuals with H. pylori infection might remain undetected, highlighting the importance of gastroscopy as a primary diagnostic approach for accurate detection and management of H. pylori-induced diseases [17]. The upper GIT endoscopy is the better way to diagnose H. pylori due to its ability to directly visualize the stomach lining and obtain tissue samples for testing. While this procedure is more costly in some regions like the United States, it has been deemed a cost-effective method in Europe, primarily due to lower procedural costs. Furthermore, gastroscopy allows for simultaneous diagnosis and management of H. pylori-related gastroduodenal disease. In contrast, non-invasive tests for H. pylori, such as serology, stool antigen tests, and urea breath testing are more convenient and independent of bacterial colonization density, therefore serving as alternative diagnostic measures, particularly in regions where the cost of gastroscopy is prohibitive [18]. In this study, the gastroscopy diagnosed the infection with H. pylori.

Moreover, gastroscopy allows for real-time identification of the specific area of H. pylori infection in the stomach, reducing sampling errors and improving detection efficacy. Furthermore, gastroscopy offers the advantage of detecting early gastric mucosa changes, which can lead to timely intervention and improved prognosis [19]. This study has found a significant association between the H. pylori infection and the endoscopic abnormalities.

In addition, for patients with long-term H. pylori infection or associated conditions, periodic gastric biopsies can help monitor disease progression. It allows for the identification of any changes in the stomach lining, such as the development of peptic ulcer, or precancerous or cancerous lesions [20]. Many studies have found that approximately 80% of peptic ulcer diseases are caused by H. pylori infection, and the lifetime risk for peptic ulcer disease in H. pylori-positive patients is approximately 15% [21]. Worldwide, gastric cancer is the third leading cause of cancer-related death, and Helicobacter pylori infection is responsible for 74.7% of non-cardia gastric cancer cases [22]. In the world, gastric cancer and peptic ulcers together cause more than a million deaths per year, and Helicobacter pylori infection is a major health concern.

CONCLUSION

H pylori is a common infection that is known to cause many complications, including peptic ulcers, gastritis, and even stomach cancer. The diagnostic tests for this bacterium are varied. Gastric biopsy, which involves taking a small tissue sample from the stomach lining to check for the presence of the bacteria. This method is considered to be the gold standard in diagnosing H pylori as it is the most accurate and reliable way to confirm the presence of the bacteria.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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انتشار عدوى الملوية البوابية بين المرضي الذين لعانون من أعراض مزمنة في المعدة ودور خزعة المعدة في تشخيصها وإدارتها

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المستخلص:

الخلفية والأهداف: عدوى الملوية البوابية هي عدوى بكتيرية شائعة تصيب الناس في جميع أنحاء العالم. يقدر أن أكثر من نصف سكان العالم مصابون بالملوية البوابية. في حين أن معدل انتشار الملوية البوابية قد انخفض في بعض البلدان بسبب تغريب نمط الحياة، إلا أنه لا يزال مرتفعًا بين كبار السن الذين ولدوا قبل بدء انخفاض معدل الانتشار. تشمل المضاعفات المرتبطة بعدوى الملوية البوابية عسر الهضم، وحرقة المعدة، وقرحة الهضم، وقد أظهرت العديد من الدراسات أن مرضى الملوية البوابية الإيجابية لديهم مخاطر عالية للإصابة بسرطان المعدة. لذلك، من الأهمية بمكان تشخيص عدوى الملوية البوابية وإدارتها بدقة، خاصة بين المرضى الذين يعانون من أعراض في المعدة، من خلال طرق فعالة مثل تنظير الجهاز الهضمي العلوي الذي تهدف هذه الدراسة إلى إثباته. **الطرق:** على مدار أربعة عشر شهرًا، تم تضمين 256 خزعة بالمنظار من مرضى يعانون من أعراض في المعدة. تم تسجيل التشوهات التنظيرية، والتشخيص النسيجي للملوية البوابية، والنتائج الباثولوجية النسيجية لخزعات قاع المعدة ثم تحليلها باستخدام برنامج احصائي. **النتائج:** 217 من إجمالي المرضى لديهم بكتيريا الملوية البوابية الإيجابية في العينات الملطخة. أصيبت الإناث بالبكتيريا بنسبة 65٪، بينما أصيب الذكور بنسبة 34٪. أظهرت النتيجة أن الفئة العمرية (29-56 عامًا) هي الأكثر تضررًا، وتمثل 50٪ من جميع الأفراد المصابين الإيجابيين. من ناحية أخرى، وجدت الدراسة علاقة وثيقة الدلالة بين عدوى الملوية البوابية والتشوهات التنظيرية، مع قيمة $p < 0.001$. أخيرًا، بالنسبة لإجمالي 256 عينة بالمنظار، كانت النتائج الباثولوجية النسيجية 43.8٪ لالتهاب المعدة المزمن و56.2٪ لالتهاب المعدة المزمن النشط. **الخاتمة:** خزعة المعدة هي اختبار يستخدم في تشخيص عدوى بكتيريا الملوية البوابية والظروف المرتبطة بها مثل قرحة الهضم، كما يمكن أن تساعد في مراقبة تطور المرض.

الكلمات الدالة. أعراض المعدة. بكتيريا الملوية البوابية، خلل التنسج، التنظير الداخلي، نتائج التشريح المرضي، غار المعدة.