*Original article*

# Prevalence of Helicobacter Pylori Infection in Relation to Gender and Age in the Population of AL-Ajailat, Libya

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## ABSTRACT

Helicobacter pylori are bacteria that can lead to an infection in the stomach or duodenum, which is the first segment of the small intestine. They are the most prevalent cause of peptic ulcer disease. If left untreated, a long-term H. pylori infection can result in complications. This study was performed to determine the prevalence of Helicobacter pylori infection and its relation to age and gender in a population of AL-Ajailat, Libya. The study was a retrospective cross-sectional study conducted in the central AL-jailat clinic (Laboratory Department) from January 2023 to July 2023 to determine seroprevalence of H. pylori infection. A total of 413 participants (127 males and 255 females, aged between 1 and 89 years) were included in this study. For the detection of H. pylori, enzyme-linked immunosorbent assay kits were utilized. In contrast, the absence of both antibodies (IgG and IgM) resulted in the designation of H. pylori-negative status. Anti-H. pylori immunoglobulin (Ig)G/IgM>22 IU/L were classified as H. pylori positive. The analysis was performed by using the statistical package for the social sciences, SPSS version 27. A total of 413 subjects were enrolled in this study. The overall prevalence of H. pylori infection was 84.7%. H. pylori infection prevalence was higher in females than in men (70.3% vs. 29.7%, p = 0.001), respectively. The highest prevalence of H. pylori infection is observed in the age groups of 40-49 years (21.4%) and 30-39 years (18.9%), compared with the other age groups, but a p-value of 0.256 suggests that there is no statistically significant association between age and H. pylori infection status. Prevalence of H. pylori infection was high in this study. H. pylori infection seroprevalence was higher in females than males and middle-aged people are more vulnerable to H. pylori infection.

## Introduction

Helicobacter pylori, formerly referred to as Campylobacter pylori, is a gram-negative, flagellated, spiral bacterium that can occasionally exhibit a slightly curved rod shape. [1]. Helicobacter pylori infection is more common in developing countries compared to developed communities. Numerous studies across various countries have reported the prevalence of H. pylori infection ranging from less than 20% in European nations to over 80% in certain Eastern Mediterranean countries [2,3]. The majority of the infected are asymptomatic, but a limited number develop digestive symptoms [4].

H. pylori infection is the leading cause of peptic ulcer disease, which accounts for 90% of duodenal ulcers and about 50 to 80% of gastric ulcers [5]. H. pylori was classified as a class I carcinogenic agent, which includes agents that can cause gastric carcinogenesis and primary gastric B-cell lymphoma [6, 7]. Numerous studies demonstrate that H. pylori's main reservoir is humans. It can spread through the gastro-oral and oral-oral routes. In addition, it has been reported that these bacteria can persist in milk and the stomachs of some animals, including sheep and cats [8].

The relationship between gender and the prevalence of H. pylori infection is still controversial [9]. The frequency of H. pylori infection increases with age. Development occurs at a faster rate in societies characterized by low socioeconomic status [10]. The prevalence of H. pylori (in either fresh or stored serum) is usually found by using serologic tests that detect immunoglobulin (Ig)G antibodies to H. pylori infection, although IgA and IgM antibodies have also been used [11]. Hence, the purpose of this study was to determine the prevalence of Helicobacter pylori infection and its relation to age and gender in the population of AL-Ajailat, Libya.

## Methods

### Study design and setting
A retrospective cross-sectional study was conducted in the central ALjailat clinic (Laboratory Department) from January 2023 to July 2023 to determine the seroprevalence of H. pylori infection. A total of 413 participants (127 males and 255 females, aged between 1 and 89 years) were included in this study. For the detection of H. pylori, enzyme-linked immunosorbent assay kits were utilized. In contrast, the absence of both antibodies (IgG and IgM) resulted in the designation of H. pylori-negative status. Anti-H. pylori immunoglobulin (Ig)G/IgM>22 IU/L were classified as H. pylori positive.

### Collection of specimens
About 3 ml of venous blood was collected from participants in a plain tube, and sera were separated and further analyzed. Finally, serum samples of 413 participants (127 males and 255 females) were available for analysis.

### Determination of Helicobacter pylori status
Anti-H. Pylori IgG and anti-IgM antibodies were analyzed using an H. Pylori IgG and IgM enzyme-linked immunosorbent assay, according to the manufacturer's instructions. Patients were categorized as H. pylori positive based on anti-H. Pylori immunoglobulin (Ig)G/IgM > 22 IU/L whereas the absence of both antibodies results in an H. pylori-negative status.

### Enzyme-linked immunosorbent assay kit principle
The antigen-antibody complex is created when antibodies specific to H. pylori in the sample attach to the immobilized antigen. The solid phase is then washed to remove any unbound sample components. A second antibody is added that is directed against human IgG antibodies and conjugates with horseradish peroxidase. The complex is bound by this conjugate. The surplus conjugate is then removed from the solid phase through washing. A colorless substrate is converted into a blue product by the enzyme-labeled complex. The degree of color development in the sample reflects the concentration.

### Statistical analysis
Statistical analysis was computerized using the Statistical Program for Social Sciences (SPSS version 27). A Chi-square test was employed to compare the different groups concerning categorical variables. Statistical significance was defined as $P \le 0.05$

## Results

Table 1 shows the Prevalence of helicobacter pylori in relation to gender, the results show that out of the total 413 cases (350 positive and 63 negative), the prevalence of H. pylori infection is 84.7% (350/413). Among the positive cases (infected with H. pylori), 29.7% (104/350) were males and 70.3% (246/350) were females. Among the negative cases (not infected with H. pylori), 47.6% (30/63) were males, and 52.4% (33/63) were females.

The chi-square value of 7.809 with a p-value of < 0.001 suggests that there is a statistically significant association between gender and H. pylori infection status. Based on the data, the prevalence of H. pylori infection is significantly higher in females (70.3%) compared to males (29.7%). This finding suggests that gender may be a risk factor for H. pylori infection, with females being more susceptible or exposed to the bacteria than males.

*Table 1. Prevalence of helicobacter pylori in relation to gender*

| Gender | Positive cases | | Negative cases | | Chi- Square | P-value |
|---|---|---|---|---|---|---|
| | Count | % | Count | % | | |
| Male | 104 | 29.7 | 30 | 47.6 | | |
| Female | 246 | 70.3 | 33 | 42.4 | 7.809 | < 0.001* |
| Total | 350 | 100.0 | 63 | 100.0 | | |

Table 2 shows Prevalence of helicobacter pylori in relation to age, the results show that the highest prevalence of H. pylori infection is observed in the age groups of 40-49 years (21.4%) and 30-39 years (18.9%). The lowest prevalence is seen in the age groups of 1-9 years (2.6%), 80-89 years (2.6%), and 70-79 years (3.1%). The chi-square value of 10.126 with a p-value of 0.256 suggests that there is no statistically significant association between age and H. pylori infection status. So, there is no clear pattern or significant association between age and the prevalence of H. pylori infection. The results show that the highest

prevalence of H. pylori infection is observed in the age groups of 40-49 years (21.4%) and 30-39 years (18.9%). The lowest prevalence is seen in the age groups of 1-9 years (2.6%), 80-89 years (2.6%), and 70-79 years (3.1%). The chi-square value of 10.126 with a p-value of 0.256 suggests that there is no statistically significant association between age and H. pylori infection status. So, there is no clear pattern or significant association between age and the prevalence of H. pylori infection.

*Table 2. Prevalence of helicobacter pylori in relation to age*

| Age in years | Positive cases | | Negative cases | | Chi Square | P-value |
|---|---|---|---|---|---|---|
| | Count | % | Count | % | | |
| 1-9 | 9 | 2.6 | 3 | 4.8 | 10.126 | 0.256 |
| 10-19 | 43 | 12.3 | 11 | 17.5 | | |
| 20-29 | 50 | 14.3 | 7 | 11.1 | | |
| 30-39 | 66 | 18.9 | 12 | 19.0 | | |
| 40-49 | 75 | 21.4 | 13 | 20.6 | | |
| 50-59 | 59 | 16.8 | 8 | 12.7 | | |
| 60-69 | 28 | 8.0 | 1 | 1.6 | | |
| 70-79 | 11 | 3.1 | 5 | 7.9 | | |
| 80-89 | 9 | 2.6 | 3 | 4.8 | | |

## Discussion

The current study represents the first seroprevalence assessment of H. pylori infection in a population of AL-Ajailat, Libya. The results of the present study demonstrate that the prevalence of (84.7%) of individuals was high in AL-Ajailat city, which is similar to others reported from several Libyan cities, e.g., Benghazi, where the authors found healthy individuals (71.4%) infected with H. pylori [12]. In terms of gender, our findings indicated that there were statistically significant differences in the prevalence of H. pylori (29.7% in males and 70.3% in females, with a p-value of < 0.001). The result of this study is in agreement with a previous study by Pajavand et al., [13]. Although some authors have reported a high prevalence of H. pylori infection in males, numerous studies have indicated no differences between genders [14-16].

The role of gender in the varying prevalence of H. pylori infection remains uncertain; however, it is increasingly acknowledged that significant sex differences exist in numerous diseases [17,18]. There is controversy about the relationship between age and prevalence of H. pylori. Several studies [19,20]. Regarding age, the present study showed that there is no statistically significant relationship between age and H. pylori infection; however, the highest prevalence of H. pylori infection was in the age group 30–50 years in both genders. Similarly, a study done in Libya found the same trend of infection in these age groups [21]. Moreover, the prevalence of H. pylori infection decreased with an increase in age up to 80 years. This finding agreed with a study in Tripoli where they found a sharp dropping in the percentage of H. pylori infection in the 60-69 and 80 years [22]. These findings go in line with those found in previous literature globally [23]. The number of older participants is limited; consequently, our results may be influenced. This has been explained as being due to a diminished serological response in older individuals and/or a reduced quantity of microorganisms resulting from gastric atrophy.

## Conclusion

The prevalence of H. pylori infection was high in this study. H. pylori infection seroprevalence was higher in females than males and middle-aged people are more vulnerable to H. pylori infection. Ongoing monitoring of the infection situation, the implementation of appropriate sanitary facilities, and enhancements in educational levels, particularly among adults, could be effective strategies for controlling this infection.

### *Limitation*

Detailed clinical data, such as risk factors and medical history, were not available in this study. Also, knowing the last time of having H. pylori eradication therapy should be available in the next study.

### *Conflict of interest.* Nil

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## Libyan Medical Journal

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# Libyan Medical Journal

**المستخلص**

البكتيريا الملوية البوابية هي بكتيريا يمكن أن تؤدي إلى إصابة المعدة أو الاثني عشر، وهو أول جزء من الأمعاء الدقيقة. وهي السبب الأكثر انتشارًا لمرض قرحة المعدة. إذا تُركت دون علاج، يمكن أن تؤدي عدوى البكتيريا الملوية البوابية طويلة الأمد إلى مضاعفات. أجريت هذه الدراسة لتحديد انتشار عدوى البكتيريا الملوية البوابية وعلاقتها بالعمر والجنس في مجموعة سكانية من العجيلات، ليبيا. الطرق. كانت الدراسة دراسة مقطعية استرجاعية أجريت في عيادة العجيلات المركزية (قسم المختبرات) من يناير 2023 إلى يوليو 2023 لتحديد معدل انتشار عدوى البكتيريا الملوية البوابية. تم تضمين ما مجموعه 413 مشاركًا (127 ذكرًا و 255 أنثى، تتراوح أعمارهم بين 1 و 89 عامًا) في هذه الدراسة. للكشف عن البكتيريا الملوية البوابية، تم استخدام مجموعات اختبار الممتز المناعي المرتبط بالإنزيم. وعلى النقيض من ذلك، أدى غياب كل من الأجسام المضادة IgG و IgM إلى تحديد حالة سلبية لـ البكتيريا الملوية البوابي. تم تصنيف الغلوبولين المناعي المضاد للبكتيريا الملوية البوابية IgG/IgM>22 IU/L على أنه إيجابي للبكتيريا الملوية البوابية. تم إجراء التحليل باستخدام الحزمة الإحصائية للعلوم الاجتماعية، الإصدار 27 من برنامج SPSS. النتيجة. تم تسجيل ما مجموعه 413 مشاركا في هذه الدراسة. بلغ معدل الانتشار العام لعدوى البكتيريا الملوية البوابية 84.7٪ . كان معدل انتشار عدوى البكتيريا الملوية البوابية أعلى لدى الإناث منه لدى الرجال (70.3٪ مقابل 29.7٪، p = 0.001)، على التوالي. لوحظ أعلى معدل انتشار لعدوى الجرثومة الملوية البوابية في الفئات العمرية 40-49 سنة (21.4٪) و 30-39 سنة (18.9٪)، مقارنة بالفئات العمرية الأخرى، ولكن قيمة p البالغة 0.256 تشير إلى عدم وجود ارتباط ذي دلالة إحصائية بين العمر وحالة الإصابة بالجرثومة الملوية البوابية. الاستنتاج. كان معدل انتشار عدوى الجرثومة الملوية البوابية مرتفعًا في هذه الدراسة. كان معدل انتشار عدوى الجرثومة الملوية البوابية أعلى لدى الإناث منه لدى الذكور، والأشخاص في منتصف العمر أكثر عرضة للإصابة بعدوى الجرثومة الملوية البوابية.