

Seroprevalence of *Helicobacter pylori* Infection in Tripoli, Libya

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Abstract

Background: Infection with *Helicobacter pylori* is typically contracted in early childhood and is associated with a variety of upper gastrointestinal disorders. There is still little local information available on infection epidemiology. This study was performed to determine the antibodies of seroprevalence of *H. pylori* in people, with their relation to age and gender. **Methods:** A retrospective epidemiologic survey was conducted in different polyclinics in Tripoli from January 2021 to December 2021 to determine the seroprevalence of *H. pylori* infection. A total of 707 participants (452 males and 255 females, with mean age of 39 ± 19.3 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 IgA) resulted in the designation of an *H. pylori*-negative status. Anti-*H. pylori* immunoglobulin (Ig) G/IgA ≥ 30 enzyme immune units were classified as *H. pylori* positive. Chi-square test was used to analyze the obtained data. **Results:** The overall positive seropositive samples among the study participants were 122 (17.2%). The seropositivity was high 42 (34.4%) among the age group 30 <40 years, compared with the other age groups. There was no significant difference between male and female cases regarding the seropositive samples. **Conclusion:** Seroprevalence of *H. pylori* infection shows a drop comparing to previously local reports. Nationwide epidemiological research is necessary for determining the seroprevalence of *H. pylori* in Libya.

Keywords: *Helicobacter pylori*, infection, Libya, seropositive, seroprevalence

INTRODUCTION

Helicobacter pylori (*H. pylori*) is a Gram-negative bacterium that colonizes gastric epithelium.^[1] It represents one of the most common bacterial infections in humans, which infected about half of the world's population.^[2] When proper treatment is not provided, *H. pylori* infection can occur in childhood and last throughout life. Some studies have suggested that infected mothers are the primary source of this infection in their children, through contact with contaminated stomach juice from the mother's mouth.^[3] According to a previous study, *H. pylori* spread from East Africa around 58,000 years ago and subsequently evolved into numerous strains with varying degrees of pathogenicity.^[4]

Numerous studies demonstrate that *H. pylori*'s main reservoir is humans. It can spread through the gastro-oral, oral-oral, and feco-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.^[5]

Infection rates have been shown to be higher in low-resource environments and developing nations, with prevalence rates above 70% reported in Africa as the highest globally,^[1] while developed countries have rates between 25% and 40%.^[6] Low socioeconomic status, overcrowding, subpar housing, inadequate sanitation (both personal and environmental hygiene), filthy water supplies, an accumulation of animal feces, and tainted food have all been linked to the high prevalence in developing countries.^[7]

According to the literature, there are regional variations in the prevalence of bacterial infection. A report from Bakka's 2002

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shows that the prevalence among Libyans was 76%.^[8] Further studies reported an infection rate ranged between 56% and 80% in Tripoli in 2007,^[9] 56.5% in Benghazi city in 2016,^[10] 60.51% prevalence rate in Misurata in 2018,^[11] and 57% in healthy and 37% in dyspeptic patients in Sebha city in 2019.^[12] In order to investigate the current prevalence of *H. pylori* infection in Tripoli, we analyzed the seroprevalence of this infection among sample of Libyans with different age groups and correlate the prevalence with age and gender of the patients.

METHODS

Study design and subjects

The study was approved by the Ethical Committee of the faculty of Medical Technology, the University of Tripoli, Libya, as an anonymous epidemiological study (IRB 2021-12). Therefore, the only data of recruited patients available for statistical analyses were age and gender. About 707 Libyan individuals attending different polyclinics in Tripoli from January to December 2021 were retrospectively included in this study, and their ages ranged between 20 and 60 years (mean 39 years).

Collection of specimens

According to the standard operating procedure, all patients who were seen in causality or outpatient clinic during the mentioned study period and from whom a blood sample was taken as part of the routine medical workup were included in the study. About 5 ml of venous blood were collected from participants in ethylenediaminetetraacetic acid tube and sera were separated and further analyzed. Finally, serum samples of 707 patients (452 males and 255 females) were available for analysis.

Determination of *Helicobacter pylori* status

Anti-*H. pylori* IgG and anti-CagA antibodies were analyzed using an *H. pylori* IgG enzyme-linked immunosorbent assay (ELISA Biohit, Rosbach, Germany), according to manufacturer's instructions. Patients were categorized as *H. pylori* positive based on anti-H pylori immunoglobulin (Ig) G/IgA ≥ 30 enzyme immune units and/or the presence of anti-CagA IgG (>6.25 U/ml), and/or the presence of anti-CagA IgG (>6.25 U/ml) whereas the absence of both antibodies resulted in an *H. pylori*-negative status.

Enzyme-linked immunosorbent assay kit principle

The antigen-antibody complex is formed when *H. pylori*-specific antibodies in the sample bind 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 conjugated with horseradish peroxidase. The complex is bound by this conjugate. The excess conjugate is then washed out of the solid phase. 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

The data were analyzed with the IBM-SPSS software package version 20 (IBM Corp., Armonk, NY). Comparison between

different groups regarding categorical variables was tested using Chi-square test. Statistical significance was $P \leq 0.05$.

RESULTS

The prevalence of *H. pylori* infection in all participants was 17.2%. However, the general seroprevalence varies with age, subjects between the age of (30–< 40) years showed 34.4% seroprevalence, whereas the lowest in the age group (≥ 60) years of 4.9% [Table 1]. However, no statistically significant difference was seen between the age groups.

Out of 122 infected patients, *H. pylori* was found in 70.5% of males compared to 29.5% of females, with no statistically significant difference was between the two groups [Table 2].

DISCUSSION

Epidemiological surveys usually use serological tests for high sensitivity and specificity which will not limit the accuracy of prevalence estimates.^[13] The epidemiology of *H. pylori* infection in Libyan population still crucial for public health investigations because of high prevalence of this infection and its association with GIT disorders.^[14] Most of the data available on the prevalence of *H. pylori* are unsatisfactory. This is because very few studies have assessed a truly normal population in Libya. The current study evaluated the current prevalence rate of acquiring *H. pylori* infection.

The present study demonstrated an overall seroprevalence rate of 17.2% in general population. No statistically significant relationship between age and *H. pylori* infection, however, the percentage was more among adolescence. This result

Table 1: Relationship between age and *Helicobacter pylori* infection

Age/ years	<i>Helicobacter pylori</i> infection		Total (n=707), n (%)	P
	Positive (n=122), n (%)	Negative (n=585), n (%)		
<20	15 (12.3)	84 (14.3)	99 (15.1)	0.23
20-<30	12 (9.8)	51 (8.7)	63 (8.9)	0.12
30-<40	42 (34.4)	175 (29.9)	217 (30.6)	0.22
40-<50	34 (27.8)	147 (25.1)	181 (25.6)	0.5
50-<60	11 (9.1)	89 (15.2)	100 (14.1)	0.17
≥ 60	6 (4.9)	39 (6.6)	45 (6.3)	0.54
Total	122 (17.2)	585 (82.7)	707 (100)	-

Table 2: Relationship between gender and *Helicobacter pylori* infection

Gender	<i>Helicobacter pylori</i> infection		Total (n=707), n (%)	P
	Positive (n=122), n (%)	Negative (n=585), n (%)		
Male	86 (70.5)	366 (62.6)	452 (63.9)	0.33
Female	36 (29.5)	219 (37.4)	255 (36.1)	0.52
Total	122 (17.2)	585 (82.7)	707 (100)	

agrees with many studies.^[15,16] The contrast results observed by Libyan study which reported the differences in prevalence among children, middle aged, and the elderly was statistically significant.^[14] A study conducted in Kuwait was found the percentage of *H. pylori* infection increased with age.^[17]

The number of participants of the older age is limited; therefore, our results may be affected. This was clarified as being because of a decrease in the specific serological response among older people and/or because of a reduced number of microorganisms as a gastric atrophy consequence.

Both genders appear to be equally exposed to *H. pylori* infection since quite increase infection in males than in females (70.5%, 29.5%). This result disagrees with many studies.^[8,14,15] However, it agrees with a meta-analysis showed that male gender is an issue related to increased prevalence for the infection of *H. pylori*.^[18]

CONCLUSION

The outcomes of this study maintained indirectly the theory that *H. pylori* infection acquisition happens initially in childhood and continues throughout life. *H. pylori* detection in patients was high of aged 30–40 years, indicates that infection with this gastric Gram-negative bacterium is still a common health problem among our population. Furthermore, we confirm that as a noninvasive method, the serologic test such as (ELISA) is a useful technique to detect *H. pylori* infection in a country like Libya where the resources and the facility of the diagnosis of *H. pylori* is limited. However, further research is needed to establish the potential role of *H. Pylori* in gastric and extragastric pathologies.

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Conflicts of interest

There are no conflicts of interest.

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