الإنتشار المصلي لبكتيريا الحلزونية البوابية في منطقة ترهونة، ليبيا "طلاب كلية التقنية الطبية جامعة الزيتونة نموذجاً"

علي جمعة زبيدة*[1]، توفيق عمار عبد المولى[2]، رياض أبوبكر إبراهيم[3]، أماني أبورقية إسويسي[4]، شيماء الشارف فرج[5]، عبير عبد القادر فرج[6]، ريان عبد العالي سعد[7]

قسم المختبرات الطبية، كلية التقنية الطبية، جامعة الزيتونة، ترهونة، ليبيا

*Zbida2015ali@gmail.com

Seroprevalence of *Helicobacter pylori* in Tarhuna district, Libya "Students of Medical technology faculty – Azzaytuna University as a model"

Ali Guma Azbida[1], Tawfg Omar Abdlmola[2], Riyad Aboubakr[3], Amani Isweesi[4], Shayyima Alsharif[5], Abeer Abdulqadir[6], and Rayan Abdulali[7]

Department of medical laboratory, faculty of medical technology, Alzzytuna university, Tarhuna, Libya

الملخص:

هدفت هذه الدراسة إلى تحديد معدل الانتشار المصلي لبكتيريا الحلزونية البوابية بين طلاب كلية االتقنية الطبية بجامعة الزيتونة الذين لاتظهر عليهم أي أعراض، كنموذج لمجتمع ترهونة. تم جمع عينات دم من 113 طالب وطالبة خلال شهر نوفمبر 2022 وفحصها باستخدام مضاد *H. pylori* IgG / IgM Rapid Test لتحديد وجود الأجسام المضادة للبكتيريا الحلزونية البوابية. أوضحت نتائج هذه الدراسة أن 73 حالة (64.60%) كانت إيجابية للإصابة بالبكتيريا الحلزونية البوابية. وجد أيضًا أنه من بين 73 حالة إيجابية ، كانت 29 حالة لها نتائج إيجابية لكل من IgG و IgM ، و 19 كانت إيجابية بالنسبة لـ IgM فقط ، و 25 كانت إيجابية بالنسبة لـ IgG فقط. خلصت هذه الدراسة إلى أن سكان منطقة ترهونة لديهم معدل مرتفع من الإصابة بعدوى *H. pylori*. كما أظهرت نتائج الدراسة الحالية أن معدل الإصابات اللاعرضية عينة في الدراسة كان مرتفع.

Abstract:

This study aims to determine the seroprevalence rate of *H. pylori* among asymptomatic students of the College of Medical Technology at Azzaytuna University, as a model for Tarhuna community.

Blood samples from 113 students were collected during November 2022 and examined using the anti-*H. pylori* IgG/IgM Rapid Test to determine the presence of *H. pylori* antibodies. The results of this study showed that 73 cases (64.60%) were positive for *H. pylori*. It was also found that among the 73 positive cases, 29 had positive results for both of IgG and IgM, 19 were positive for IgM only, and 25 were positive for IgG only. This study concluded that, the population in Tarhuna region has a considerably high frequency of *Helicobacter pylori* infection. The current study's findings demonstrated that the study sample had a very high prevalence of asymptomatic *H. pylori* infection.

Keywords: *Helicobacter pylori*, IgG/IgM, Seroprevalence, and infection.

INTRODUCTION:

Helicobacter pylori (*H. pylori*) is a Gram negative bacteria, it was identified in first time in the dogs' stomach in 1892 [Bizzozero, 1893]. The prevalence of *H. pylori* infection increases with age, the infection is typically acquired during childhood, person-to-person transmission is thought to occur through oral-oral, fecal-oral, or sexual routes; in the absence of effective treatment, the infection persists for life [Lai and Sung, 2007; Uyanıkoğlu et al, 2012; Zamani et al, 2017]. About 90% of *H. pylori* infected people do not develop symptoms and do not complain of any complications [Bytzer and Dahlerup 2011]. However, individuals infected with *H. pylori* have a lifetime risk of 10% to 20% of developing peptic ulcers and cancers directly related to this infection [Abbas et al, 2017; Chang and Parsonnet et al, 1994; Kusters et al, 2007]. Acute infection may present as an acute gastritis accompanied with abdominal pain or nausea; if it develops into chronic gastritis, the symptoms, if any, are non-ulcer dyspepsia, stomachaches, nausea, loss of appetite, bloating, belching, and sometimes vomiting [Butcher 2003; Ray and Ryan 2014]. Stomach bleeding can also occur as evidenced by the passage of black stools [Suerbaum and Michetti 2002; Wagner et al, 2017]. *H. pylori* infected individuals may also develop polyps in the colon, rectum, or stomach (non-cancerous growths) [Markowski et al, 2016; Rojas and Spencer 2017; Wu et al, 2013]. *H. pylori* pathogenic process is particularly complex, it consists of three main steps: colonization, immune escape, and disease induction [Butcher 2003]. There are two main protocols for detecting the presence of *H. pylori* infection; invasive tests "histological evaluations using gastric biopsy specimens include rapid urease testing (RUT), culture, and polymerase chain reaction (PCR)", and Non-invasive tests "serological evaluation, stool antigen analyses, and the commonly used carbon13 (13C) or carbon14 (14C) urea breath tests" [Garza-González et al, 2014; Pohl et al, 2019].

The prevalence of *H. pylori* varies from country to country as well as from one region to another in the same country, it is difficult to determine its prevalence, as there is no health system collecting record-based findings of *H. pylori* prevalence in developing countries [Hooi et al, 2017; Vilaichone et al, 2013]. It is estimated that *H. pylori* infects more than half of population worldwide [Öztekin et al, 2021]. In the study of Mezmale et al. (2020), it was determined that the prevalence of *H. pylori* infection in China, Russia, Iran, Jordan, Canada, and Latin American countries was high [Mezmale et al, 2020].

The seroprevalence of *H. pylori* infection was examined in 7465 adult United State population, the *H. pylori* prevalence was 32.5% [Everhart et al, 2000]. A cohort of Swedish children from 6 months to 11 years of age were monitored to determine the prevalence of *H. pylori* infection by measuring IgG and IgA antibodies, 13.6% were found to have been infected at some time [Granström et al, 1997]. The prevalence rate of *H. pylori* in Sari area, northern Iran, 44.5% among 497 individuals of study population [Maleki et al, 2019]. Okoroiwu et al (2022) study in Nigeria found that among 384 persons in Owerri, Imo State, Nigeria, the seroprevalence of *H. pylori* infection was 74.23% [Okoroiwu et al, 2022]. A study of 350 participants in the United Arab Emirates (UAE) tested for *H. pylori* using a stool antigen test found that 41% of them were infected [Khoder et al, 2019]. In Saudi Arabia, the study conducted by Mahrazi et al, 2020 to determine the seroprevalence of *H. pylori* infection in some male students at Jazan University, showed that, 55% of study sample were positive for IgG antibody against *H. pylori*, whereas all samples were negative for IgM antibody against *H. pylori* [Mahrazi et al, 2020].

In Libya, several studies have been conducted in different regions of the country to determine the prevalence of *H. pylori* infection, for example: In the study of Mohamed et al, (2011) in Benghazi Teaching Hospital, 662 subjects were screened for anti-*H. pylori* serum IgG, the results showed that 71.4% of the total cases were positive. A study conducted in the Libyan south on a sample of inpatients at Sebha Medical Center who were confirmed to have peptic ulcer to determine the prevalence of *H. pylori*, obtained results showed that 56.3% were positive [2016 مختـار المكشر]. *H. pylori* infection among secondary school and university students in Qasr Khair district was studied by Nami et al, 2020, the results showed that the seroprevalence of *H. pylori* was 85% in the university students, and 65%, in the secondary school students "males", and 81% secondary school students "females". The study of Abufaris 2021 investigates 1712 asymptomatic Libyan subjects in Bani Waleed region, in order to screen *H. pylori* prevalence, the results reported that 68.3% were *H. pylori* infected cases. In a previous study evaluating the prevalence of *H. pylori* infection with gastroenteritis in Mesllata region of Libya, serum samples were collected from 69

patients with gastrointestinal disorders and screened for anti *H. pylori* IgG. The results showed that 76.8% were positive [Ajedi et al, 2022].

In a study conducted in Tarhuna, Libya, on the results of 815 cases that were recorded from the city's medical laboratories' records during the years 2017–2019 to detect *H. pylori* bacteria, the results showed that the infection rate was 47.3% [2021 اعتصام التومي وأخرون].

Most of the previous studies "whether in Libya or abroad" agreed that *H. pylori* is high widespread among the world's population and causes many health and economic problems. Accordingly, this study conducted to find out the extent of its prevalence among the residents of Tarhuna region (especially with the lack of previous studies in this region). The study was conducted on students of the Faculty of Medical Technology at Azzaytuna University as a model.

Aim of the study:

This study aims to determine the seroprevalence rate of *Helicobacter pylori* bacteria in Tarhuna district.

Materials and methods

Study area and Population: This study was conducted in Tarhuna region during November 2022. The study was conducted on 113 volunteers (26.6%) out of 428 students of the College of Medical Technology at Azzaytuna University (in the second, third and fourth years). A questionnaire in Arabic language includes many questions about important variables that have an impact on the results of this study was designed, it was answered by the volunteers in this study.

Analysis method and reagents: The test was carried out using the anti- *Helicobacter pylori* IgG/IgM Rapid Test. The test cassette contains *H. pylori* antigen coated particles and anti-human IgG, and anti-human IgM coated on the membrane [Biotest 2019].

Data analysis:

The obtained results were included in tables and figures then discussed, results were expressed as numbers and percentages.

Results:

The results of this study showed that 73 of 113 cases (64.60%) were positive for *Helicobacter pylori*, and 40 cases (35.40%) were negative. It was also found that among the 73 positive cases, 29 had positive results for both of IgG and IgM, 19 were positive for IgM only, and 25 were positive for IgG only. As shown in Table 1 and Figure 1

Table 1: shows the positive and negative results for *H. pylori* in study sample.

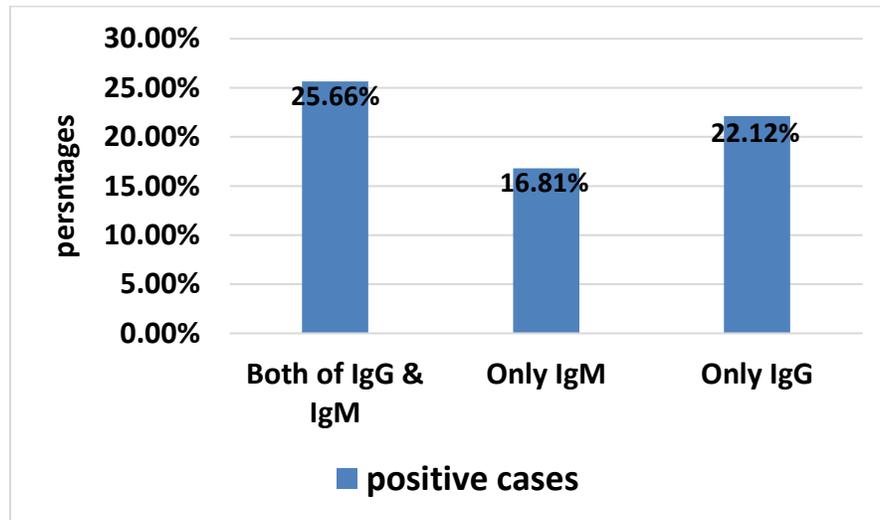| Results	Frequency	Percent
Positive	73	64.60 %
Negative	40	35.40%
Total	113	100%

Figure 1: the distribution of positive cases of *H. pylori* according to IgG, IgM, or both.

With regard to the 29 cases whose results were positive for both of IgM and IgG, it was found that only two cases reported that they had complained from peptic ulcer, but they had not been diagnosed with *H. pylori* before, while one case did not suffer from peptic ulcer, although previously diagnosed with *H. pylori* "not taken any treatment for this bacteria".

While of the 19 cases that were positive just for IgM, three complained of peptic ulcer, one of whom had been diagnosed with *H. pylori* and had not taken treatment for this bacteria. On other hand, another one case was not suffering from peptic ulcer, although it was diagnosed as infected with *H. pylori* before and he had taken the treatment.

Also, of the 25 cases that were positive for IgG only, 5 complained of peptic ulcer, 3 of them had been diagnosed with *H. pylori* and 2 of them had taken treatment for this bacteria.

The current study also showed that, among the 40 cases whom were negative for both IgG and IgM, there were 4 cases complained from peptic ulcer "none of which had been diagnosed with

H. pylori. On the other hand, another case did not have a peptic ulcer, despite being diagnosed with H, pylori before and had given treatment.

Generally, with regard to the suffering of the studied cases from peptic ulcer in the past, the results of this study showed that 14 (12.39%) cases out of 113 were suffering from peptic ulcer, and among these, 4 cases were previously diagnosed with H, pylori, two of them took up the treatment. As elucidates in table 2.

Table 2: shows the distribution of cases that previously suffered from peptic ulcer

Result	Diagnosed with H. pylori		Did not diagnosed with H. pylori		Total
	treated	not treated	treated	not treated	
IgG & IgM positive	0	0	0	2(1.77%)	**2(1.77%)**
Just IgM positive	0	1(0.88%)	0	2(1.77%)	**3(2.65%)**
Just IgG positive	2(1.77%)	1(0.88%)	0	2(1.77%)	**5(4.42%)**
Negative	0	0	0	4(3.54%)	**4(3.54%)**
Total	2(1.77%)	2(1.77%)	0	10(8.85%)	**14(12.39%)**

Regarding to the previously diagnosed with H, pylori infection, the current study showed that 7 cases (6.19%) were infected, 4 of them were complained from peptic ulcer, two of them took up the treatment. As elucidates in table 3.

Table 3: elucidates the distribution of cases previously diagnosed with *H. pylori*

Result	Complained from peptic ulcer		Was not complained from peptic ulcer		Total
	treated	not treated	treated	not treated	
IgG & IgM positive	0	0	0	1(0.88%)	**1(0.88%)**
Just IgM positive	0	1(0.88%)	1(0.88%)	0	**2(1.77%)**
Just IgG positive	2(1.77%)	1(0.88%)	0	0	**3(2.65%)**
Negative	0	0	1(0.88%)	0	**1(0.88%)**
Total	2(1.77%)	2(1.77%)	2(1.77%)	1(0.88%)	**7(6.19%)**

With regard to the number and type of symptoms of *H. pylori* infection that the participants in this study complained about, the results showed that:

13 (11.50%) of cases reported that they were complaining of 3 symptoms or more, one of them whose result was positive for both of IgG and IgM and suffering from peptic ulcer and did not

take treatment, 4 cases whose results were positive for IgG only, and they had suffered from peptic ulcer, "2 of them are taken the medication, and 3 of them have been previously diagnosed as infected with *H. pylori*", one case was positive for IgM only "was suffering from peptic ulcer and had not been previously diagnosed as infected", while 7 cases out of 13 were negative, "including 2 cases who were suffering from peptic ulcer and another case had previously been diagnosed as infected".

61 cases (53.98%) had 1 or 2 symptoms, 21 of them whose result was positive for both IgG and IgM, all of these cases had not been previously as infected diagnosed with *H. pylori*, although one had peptic ulcer, 12 cases whose results positive only for IgM, among which 2 complained from peptic ulcer "one of them was previously *H. pylori* diagnosed", and 9 cases were positive only for IgG, and 9 cases were positive only for IgG, among them, one with peptic ulcer, and no case had been previously diagnosed as *H. pylori* infected, while 19 cases were negative, two of which were suffering from peptic ulcer when no cases had previously been diagnosed as infected".

39 (34.51%) of cases reported that they did not suffer from any symptoms, all of these cases had not been suffering from peptic ulcer, 2 of them were previously been diagnosed with *H. pylori* infection "one was only positive for IgM and taken the treatment". As showed in table 4 & figure 2.

Table 4: shows the distribution of *H. pylori* symptoms among study sample

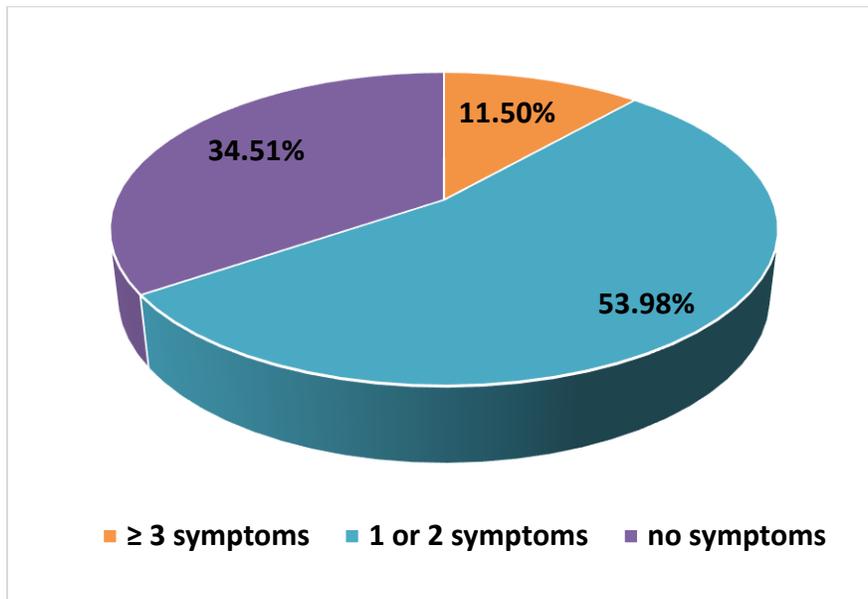| Result	≥ 3 symptoms	1 or 2 symptoms	no symptoms	Total
IgG & IgM positive	1(0.88%)	21(18.58%)	7(6.19%)	29(25.66%)
Just IgM positive	1(0.88%)	12(10.62%)	6(5.31%)	19(16.81%)
Just IgG positive	4(3.54%)	9(7.96%)	12(10.62%)	25(22.12%)
Negative	7(6.19%)	19(16.81%)	14(12.38%)	40(35.40%)
Total	13(11.50%)	61(53.98%)	39(34.51%)	113

Figure 2: shows the distribution of *H. pylori* symptoms among study sample

DISCUSSION:

Due to the high frequency of *Helicobacter pylori* infection and its link to peptic ulcers and chronic dyspepsia, epidemiological studies on *H. pylori* infection among the Libyan population is crucial for public health (particularly among individuals who do not exhibit any symptoms). For this, the current study's objective was to determine the prevalence of *H. pylori* infection among medical technology students as a model for the population of Tarhuna region in western Libyan. The sample were targeting un specific population selected randomly from students of medical technology college in a specific period during November 2022.

This study gave some information regarding the prevalence of *H. pylori* infection among the population in Tarhuna region, Libya.

Through the results of the current study, it is clear that the prevalence rate of infection with *H. pylori* in Tarhuna region is considered among the high rates, that the *H. pylori* was present in 73 out of 113 cases, which represents 64.60%, (29 of which had positive results for both of IgG and IgM, 19 for IgM only, and 25 for IgG only).

These findings appear to be in accordance with the high rates of *H. pylori* infection which reported by most of the previous studies e.g. the literature reviewer study by Mezmale et al 2020 that found that *H. pylori* prevalence was high in Russia, Jordan, Iran, Arctic populations in Canada, China, as well as in Latin American countries. Also in Russia, the prevalence of *H. pylori* infection was 88% among adults and 44% among children [Malaty et al, 1996]. In the same context, the test results showed that 55.00% of a sample of Saudi university students had positive IgG

antibodies against *H. pylori* [Mahrazi et al, 2020]. In addition, in Iraq, Hussen et al in 2013 mentioned that 55.80% of 173 students were positive for *H. pylori*. [Okoroiwu et al, 2022]

The present findings are also consistent with several studies conducted in Libya such as the one conducted in Kasr Khiar region by Nami et al in 2020, which found that among 125 asymptomatic university students 85% were positive for *H. pylori*. Results from identical study in Sirte (Libya) showed that a positive antibody was found in 50 out of 60 samples (the infection rate was around 83%) [Abdallah et al, 2021]. Also in Banghazi Teaching Hospital, the study of Mohammad et al, 2011 detected that seropositivity ratio for *H. pylori* was 71.4 % out of 662 participants. Likewise, in the city of Tarhuna, where the study which was conducted as a graduate research in the College of Science in 2021, revealed that 47.3% of the 815 cases whose results were obtained from the city's medical laboratory records were positive for *H. pylori* [2021 اعتصام التومي وأخرون].

On the other hand, these results do not concur with some studies e.g. study of Moujaber et al (2008) in Australia, which found that the prevalence of *H. pylori* infection was 15.1%.

Due to the narrow age range of this study's sample (19–23 years), there were no statistically significant differences regarding to age, this finding not agree with findings of numerous earlier studies, which indicated that the infection incidence rises with age [Hussen et al, 2013; Nami et al, 2020; 2021 اعتصام التومي وأخرون].

According to this study's findings, 12.34% of cases overall complained from peptic ulcers (3.54% of them were diagnosed with *H. pylori* infection, and 8.85% had not diagnosed), while the findings also revealed that 65.45% of the study sample complains from some symptoms of *H. pylori* whereas 34.51% have none.

The anticipated causes for the high incidence ratio of *H. pylori* bacteria in Tarhuna region are: educational level, socioeconomic status, living conditions, poor eating habits, drinking water from untreated wells, consuming spicy foods, and irregularity in taking *H. pylori* medication.

CONCLUSION:

This study concluded that *Helicobacter pylori* infections particularly asymptomatic *H. pylori* infections are considerably common in the Tarhouna region's population.

The following factors are thought to contribute to the high prevalence of *H. pylori* bacteria in Tarhuna district: living conditions, educational level, poor dietary practices, use of untreated well water, and irregular use of *H. pylori* treatment.

Recommendations:

At the end of this research the following are recommended:

1- Raising public awareness of health issues and making them aware of the seriousness of *H. pylori*, ways to prevent infection and how to deal with it.

2- Emphasizing the need to apply general health and personal hygiene standards, such as making sure to wash hands before preparing or eating meals as well as thoroughly washing fresh fruits and vegetables.

3- It is crucial to ensure that your water is sanitized, especially water coming from wells.

4- More studies are advised to be done to know more broadly the prevalence of *H. pylori* among different society groups.

5- It is also advised to conduct more research's to improve diagnostic and therapeutic approaches.

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