

THE PREVALENCE OF *HELICOBACTER PYLORI* INFECTIONS AND THE ASSESSMENT OF SOME RELATED FACTORS AMONG MEDICAL TECHNOLOGY STUDENTS

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ABSTRACT

Helicobacter pylori (HP) are gram-negative spiral bacteria that colonise the human stomach. They are present in about half the world's population. *Helicobacter pylori* (*H. pylori*) infection is now considered one of the most common human bacterial infections. The bacteria are associated with serious gastrointestinal tract (GIT) diseases, including gastritis, peptic ulcers, mucosa-associated changes to lymphoma, and gastric cancers in adults. Direct contact between people (oral-oral or faecal-oral routes) is recognized as the main route of infection transmission, followed by food and water from contaminated sources. This study aimed to determine the seroprevalence of *H. pylori* among some patients suffering from GIT disorders at the Faculty of Medical Technology. Venous blood was collected from 100 students at the Faculty of Medical Technology, University of Zawia. Sera were separated and analysed using Rapid test to determine *H. pylori* IgG antibodies. A total of 100 sera samples was collected and analysed. The population was aged 18 – 25 years. *H. pylori* antibody was found in 43 (43%) of the 100 patients examined. The age group (18 – 19) showed a high positive anti-*H. pylori* IgM in 13 (30.2%) subjects. Positive anti-*H. pylori* IgM was 51% and 49% in males and females, respectively. Based on the findings of this study, it may be concluded that the Faculty of Medical Technology is seemingly endemic with *H. pylori*. The rate of infection decreased with age and was more pronounced in males than females.

KEYWORDS: *Helicobacter pylori*, GIT disorders, Rapid test, blood groups.

INTRODUCTION

H. pylori (HP) can be defined as Gram-negative spiral bacteria colonising the human stomach (Buta, *et al.* 2010). These microorganisms (MO) are associated with serious GIT diseases including chronic gastritis, peptic ulcer, mucosa-associated changes to lymphoma, and gastric cancers in adults (Parsonnet, 2006). The specific mode of *H. pylori* transmission of infection is unknown but direct contact, either through the oral-oral route or the faecal-oral route, is regarded as the main source of infection, followed by contaminated food and water (Blaser, 1990). *Helicobacter pylori* infection is now recognized as one of the most commonly-encountered human bacterial infections. It is also important in the pathogenesis of gastroduodenal diseases (Blaser, 1990; Parsonnet, 2006). Once established, untreated infection can persist for life, and only 30% of infected persons show clinical symptoms (Kusters, *et al.* 2006). Most patients are asymptomatic, but some develop severe gastro-duodenal diseases, including duodenal ulcer, gastric ulcer, and, rarely, gastric

adenocarcinoma and gastric mucosa-associated lymph tissue (MALT) lymphoma (Buta, *et al.* 2010).

Approximately, this microorganism (MO) infects more than half of the world's population (Kimmel, *et al.* 2000), varying in connection with geographical distributions and factors, ethnicity, age, and socioeconomic factors. Mainly, these variations are due to socioeconomic differences among populations, lack of adequate hygiene, contaminated water, diets, overcrowding, etc. The incidence of *H. pylori* infection is higher in developing countries (70 – 90%) than the developed world (50%) (Kusters, *et al.* 2006). Further, the incidence of infection also occurs more often at a younger age (Torres, *et al.* 2000). The infection encourages cellular and humoral immune responses in most patients. Specific serum antibody measurements are used as a non-invasive method to detect infection of *Helicobacter pylori* (Bakka, *et al.* 2009).

The prevalence of *Helicobacter pylori* infections is divergent in different societies and geographical locations. Also, it relies on socio-demographic factors, socioeconomic status, hygiene and sanitary conditions, and lifestyle (Kusters, *et al.* 2006). A study carried out to evaluate the prevalence of microorganism through serum antibody detection showed that an infection rate of 81% (Parsonnet, *et al.* 2006). A similar study in Kuwait reported an 86% infection rate, while 82% was found in another (Waleed, *et al.* 2010). The rate of infection in Kingdom of Saudi Arabia was noticed to be lower than the previously mentioned rates, where only 145 (74%) of the 196 dyspeptic patients were established to be infected (Mohamed, *et al.* 2017). Among Sudanese subjects with gastroduodenal inflammation, the prevalence of *H. pylori* was 80% in individuals with gastritis and only 56% in those with duodenal ulcers (Alo, 2013).

Many studies regarding the prevalence of *H. pylori* infections have been performed in Libya. The infection is very common in patients with chronic dyspeptic symptoms. It is generally acquired in early childhood and is linked to various disorders of the upper GIT (Mohammed, *et al.* 2017). An investigation was carried out in Benghazi to correlate the incidence of *H. pylori* infections among individuals from different areas of Libya who had gastrointestinal illnesses. This investigation revealed a prevalence rate of 69.7% and 81% (Bakka, *et al.* 2009; Mohammed, *et al.* 2017). Similarly, a study in Zeliten stated 79.8% of *H. pylori* infections for IgM and 78.2% for IgG. From this study, the population observed significantly correlated with age ($p < 0.05$). An additional study, also in Benghazi, reported 53.3% rates of infections among children aged 1 – 12 years, while another reported 56.5% infection rates amid children in the same age group (Khaled and Ramadhan, 2016). However, no such studies have been executed in the city of Zawia. Therefore, the main aim of this study was to investigate the prevalence of *Helicobacter pylori* infections among the investigated population of students at the Faculty of Medical Technology, Zawia University. In addition, there are some specific objectives including:

1. To consider the prevalence of infections among students in regards to age and gender.
2. To assess the correlation of different lifestyles with *Helicobacter pylori* infections.
3. To investigate the relationship between blood groups and *H. pylori* infections.

METHODS AND MATERIALS

Sample Collection

This current study was conducted at the Faculty of Medical Technology, Zawia University. Serological survey of *H. pylori* IgG- and IgM-antibodies in 100 students, aged 18 – 25 years. The sample collection period stretched from 1st January until 20th March 2019.

All students participating in the study were evaluated with a predesigned questionnaire, which was distributed

at the Faculty of Medical Technology. Each questionnaire contained a written permission section, where the students allowed for their information to be used in this study. The questionnaire comprised of a table withholding the information needed in this project. A copy of it is attached in the appendix.

A venous blood sample of 5ml was collected from each subject included in the study. The sample was stored without a coagulating agent as recommended by standard techniques. Samples were allowed to clot and after 20 minutes, serum was collected using centrifugation at 3000 rpm. Qualitative detection of *H. pylori* antibodies, IgG and IgM, were identified using Rapid test cassette and the tests were performed following the manufacturer's guidelines.

Statistical Analysis

Data collection and analysis was performed using SPSS, version 20. Numerical and percentage data were analysed using two-tailed Chi-test, while mean and SD data were examined with Student t-test. Logistic regression analysis was applied for the assessment of possible risk factors, too. P values were set at 0.05, with statistical significance as: $P > 0.05$ = non-significant; $P < 0.05$ = significant; and $P < 0.001$ = highly significant. Bar and pie charts were created using Microsoft Excel 2013.

RESULTS

During the 3-months study period (January – March), a total of 100 patients (51 males and 49 females) were included in this study. A sum of 43 persons (43%) were positive for *H. pylori*, and the remaining 57 (57%) were negative (Figure 1).

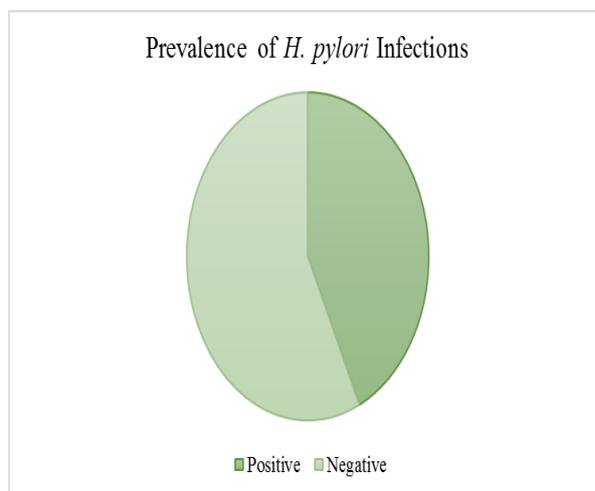


Figure 1: Prevalence of Infection.

Table 1 seroprevalence of *H. pylori* according to age. This shows the prevalence of infections among the students according to age. The distribution of the results illustrates that among the age groups, the peak of infections is at age group (18 – 19) with a total of 13 infections (30.2%).

<i>H. pylori</i> Infection				
	Positive		Negative	
Age (years)	No.	%	No.	%
18 - 19	13	30.25	13	22.8
20 -21	10	23.25	14	24.6
22 - 23	10	23.25	16	28.1
24 -25	10	23.25	14	24.6
Total	43	100	57	100
Mean ± SD.	10.75 ± 1.5	25 ± 3.5	14.25 ± 1.25	25 ± 2.21

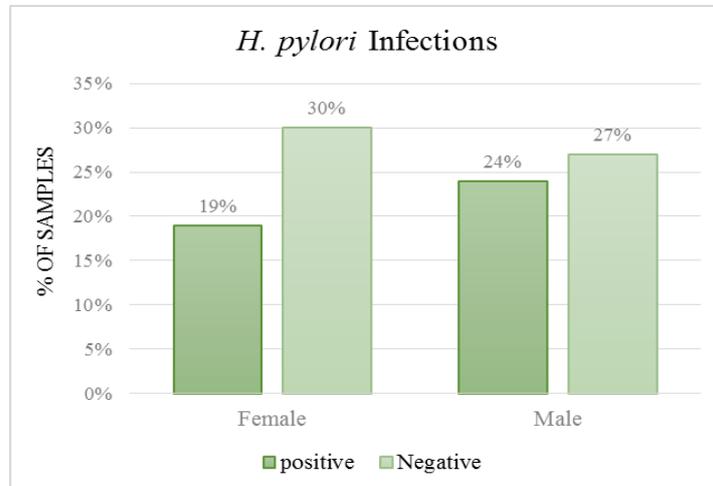


Figure 2: Seroprevalence of Infections According to Gender.

Figure2: Overall, there was no much difference among the other age groups. However, gender seems to play a huge role in the seroprevalence, as females appeared to

be more susceptible to infections (24%) than males (19%), as portrayed in Figure 2.

Table 2: Assesses the correlation of different lifestyles with *Helicobacter pylori* infections. Though many aspects were taken into consideration, no connection was detected in any of them.

<i>H. Pylori</i> Infections								
	Positive				Negative			
	No. & %				No. & %			
	Male	Female	Male	Female	Male	Female	Female	
<i>Source Of Water</i>								
Tap	5	20.8%	3	15.78%	5	18.5%	5	16.66%
Mineral	4	16.6%	5	26.13%	2	7.40%	10	33.33%
Treated	15	62.5%	11	57.8%	20	74.1%	15	50%
<i>Family Size</i>								
1 - 4	13	54.16%	10	52.6%	17	62.9%	11	36.66%
5 - 8	6	25%	8	42.10%	7	25.9%	14	46.66%
9 - 12	5	20.8%	1	5.26%	3	11.1%	6	20%
<i>Coffee / Tea</i>								
Yes	20	83.3%	17	89.4%	23	85.2%	25	83.33%
No	4	16.6%	2	10.52%	4	14.8%	5	16.66%
<i>Smoking</i>								
Yes	16	66.66%	10	52.6%	19	70.4%	9	30%
No	8	33.33%	9	47.3%	8	29.6%	21	70%
<i>Fast Food</i>								
Yes	19	79.16%	16	70.90%	24	88.9%	26	86.6%
No	5	20.8%	3	15.78%	3	11.1%	4	13.3%
<i>Heredity</i>								
Yes	15	62.5%	15	78.9%	22	81.5%	23	76.66%
No	9	37.5%	4	21.05%	5	18.5%	7	23.33%
<i>Monthly Income</i>								

≤1000	14	58.33%	9	47.36%	13	48.1%	14	46.66%
1500-2000	5	20.8%	9	47.36%	8	29.6%	10	33.33%
>2000	5	20.8%	1	5.26%	7	25.9%	6	20%

Next, the correlation of HP seropositivity and blood groups was examined according to gender (Figures 3, 4&5). The relationship was investigated using two-tailed Chi-test. In Figure 3, blood groups B- and AB- showed very similar infection rates among both sexes with a very slight increase in males' infection rates. Meanwhile blood group O+ recorded the highest numbers of infections among female subjects (1.8), it also held the lowest infection rates among males (1.3). Clear significance is established between the mean numbers of infected and non-infected male students in blood group AB+ (Figure 4). From Figure 5, it is interpreted that blood group O+ scored the highest level of infections, followed by AB+. However, blood group AB+ showed a more significant difference between infected and uninfected rates.

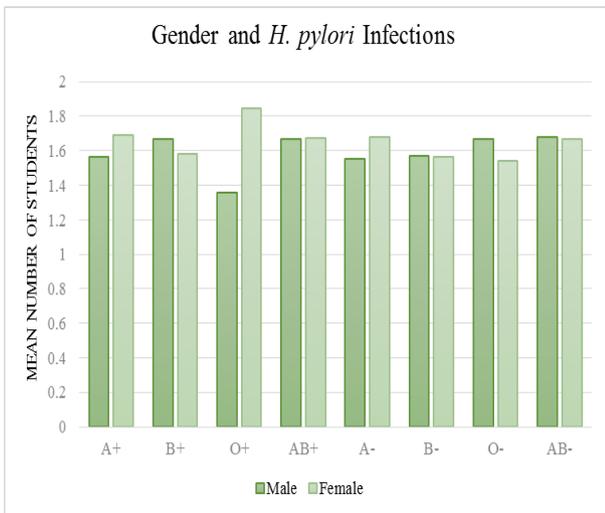


Figure 3: Correlation of h. PYLORI Seroprevalence and Blood Groups.

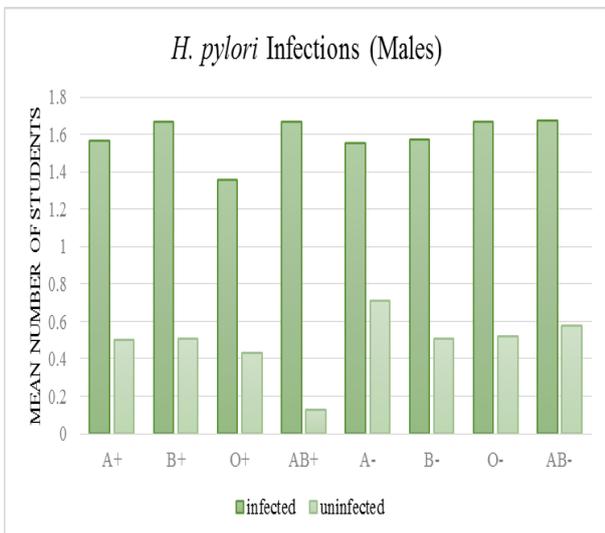


Figure 4: Correlation of H. Pylori Seroprevalence and Blood Groups (Males).

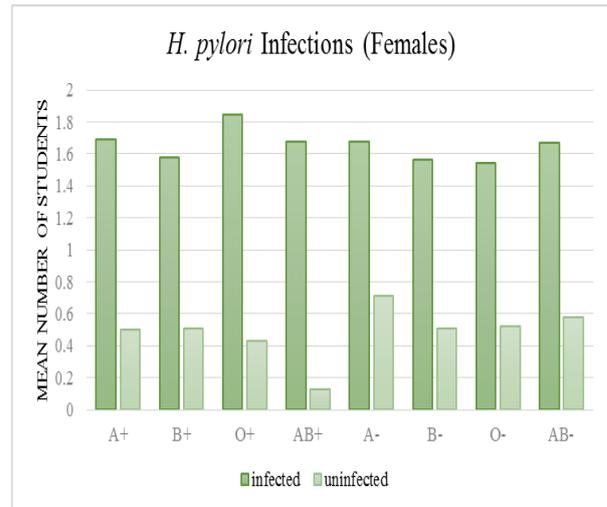


Figure 5: Correlation of h. Pylori Seroprevalence and Blood Groups (females).

DISCUSSION

H. pylori is a Gram-negative spiral bacterium colonising the human stomach (Buta, *et al.* 2010). It is linked with various serious GIT disorders, including mucosa-associated changes to lymphoma, and gastric cancers in adults (Bakka, *et al.* 2009). The exact mode of transmission is not yet known. The infection is now considered one of the most frequently encountered human bacterial infections.

Countless studies regarding the subject have been published globally, and numerous have been carried out in Libya. The epidemiology of HP infection among the Libyan population is very important for public health investigations because of its high occurrence as well as its association with various other GIT disorders. However, none were accomplished in Zawia city, and only a few focused on universities and educational sites. So, in comparison with previous and similar literature, this research is, as far as we know, the first of its kind to be carried out in Zawia city.

The current study established an overall seroprevalence rate of 43%. A lower prevalence rate of 20 – 30% was found in healthy individuals in developed countries (Jones DM, *et al.* 1968), where the study was geographically-dependent and related to age. Four studies executed in Libya showed varying results. Two of these carried out in Tripoli had similar results to this current study; 35% (Altayyar, *et al.* 2015) and 56.5% prevalence rates among the general population (Khaled and Ramadhan, 2016). Dissimilarly, two additional studies in Libya found seroprevalence rates of 70.8%, among healthy persons (Mohammad, *et al.* 2011), and 82%, in those suffering from chronic dyspepsia (Bakka,

et al. 2009). Still, most of the data available on the prevalence of *H. pylori* are unsatisfactory.

As for gender, however, this study found no significant relation, though males seemed to be slightly more susceptible to infection (30%) than females (27%). These results are in agreement with numerous studies performed in Libya as well as other countries. A study in Tripoli found that the prevalence of HP infections in regards to sex was almost the same, 35.9% (males) and 36% (females), and so, no statistical significance was established (Altayyar, *et al.* 2015). Additionally, another study also found no relationship between gender and infections as both seemed to be equally susceptible to infection, females 41.6% and 58.4% for males (Khaled and Ramadhan, 2016). Further studies also agree with these findings, where no significance was found between gender and HP infections (Mohammad, *et al.* 2011; Rana M. Abu Mugsieb, 2007; Bakka, *et al.* 2002; Altuglu, *et al.* 2011). Nonetheless, a few studies did find some connections between gender and *H. pylori* infections. A meta-analysis designated that male gender is a factor linked with elevated prevalence for infections, though the researchers admitted limitation by sparse primary data, thus making it difficult to control confounding variables (Drumm B, *et al.* 1990). A review paper also acknowledged the significance of gender and infection (Goodman and Correa, 1995).

In regards to age, this study found a peak of infections, a total of 13 (30.2%), at age group (18 – 19), while infections decreased and remained constant across the remaining age groups (23.25%). Similarly, an investigation in Tripoli found no significant association between the variables but did conclude a general decrease of infections with advanced age (Khaled and Ramadhan, 2016), agreeing with previous literature in Palestine, Ethiopia, and many others (Rana M. Abu Mugsieb, 2007; Alemayehu A. 2011). In contrast, various studies have concluded otherwise. For example, a study in Tripoli, Libya, found an increasing trend of infections with progressing age, ranging from (6.3%) in the 9 – 19-year-old to (55%) in the 40-49-year-old, and then dropping drastically to 0% in the 60 – 69 and 80 – 89-year-old groups (Altayyar, *et al.* 2015). These findings go in line with those found in previous studies (Tadesse, *et al.* 2014). Furthermore, a Kuwaiti study determined a steady positive correlation between age and HP infections (Waleed M., *et al.* 2014). The current study was limited by specific age groups that only include students at the Faculty of Medical Technology, and this may have affected the seroprevalence in respects to age, as no samples under the age of 18 nor over the age of 25 were collected.

Low socioeconomic statuses were not associated with the prevalence of *H. pylori* infection in the studied population, in agreement with a study conducted in Tripoli (Altayyar, *et al.* 2015). The findings of the present study contrast with results obtained by other

authors who found that low socioeconomic status is associated with increase in prevalence of *H. pylori* infection (Banatvala, *et al.* 1993; Goldman, *et al.* 2006). In addition, a Libyan study, carried out in Benghazi, also contradicts our findings as they declared that socioeconomic deprivation significantly modifies HP prevalence (Mohammad, *et al.* 2011), approving with another study (Moayedi P., *et al.* 2002).

Family size was also irrelevant in this study, as no correlation was detected. Our findings are similar to those concluded by another research performed in Benghazi, which also found no correlation (Khaled and Ramadhan, 2016). These results are also in line with a Mexican study (Torres J., *et al.* 1998). On the other hand, some studies did find a connection between family size and the prevalence of infection. For example, one that was conducted in Benghazi stated that the number of siblings was a strong predictor of infection (Mohammad, *et al.* 2011), which is similar to the results of another study (Galpin, *et al.* 1992).

Stimulants (smoking and consuming tea and coffee) were expected to be a dominant factor in the prevalence of *Helicobacter pylori* but showed no significance in our study. Likewise, many other studies did not find any connections. Two studies conducted in Benghazi declared that smokers are not more likely to be infected than non-smokers (Khaled and Ramadhan, 2016; Mohammad, *et al.* 2011). These findings contradict with another study in Tripoli that found a positive correlation between smoking and *H. pylori* infections (Altayyar, *et al.* 2015), agreeing with the results of many other studies around the world (EUROGAST study group, 1993; Forman, *et al.* 1993). As for the consumption of tea and coffee, some studies detected an increase in percentage of HP infections, reaching 85.8% in those who did consume stimulant beverages in contrast to 14.2% in those who did not (Khaled and Ramadhan, 2016), while another study observed that drinking coffee was not associated with the infections (Khaled and Ramadhan, 2016). Some of the studies where a positive correlation between the consumption of coffee and HP infections was found justified this by saying that coffee intake supports the growth of *H. pylori* by suppressing acid production (Alemayehu A., 2011).

The source of drinking water seemed to have no effect on the level of infection. Various studies support this as they also did not find any relation between the water source and infection rates (Khaled and Ramadhan, 2016; Torres J, *et al.* 1998). Conversely, a study in Sudan did find a positive correlation (Abdallah T, *et al.* 2014).

Interestingly, family history also appeared to be not to be of importance. One study stated that family history of epigastric pain increased the chance of *H. pylori* harbouring (Mohammad, *et al.* 2011). German research concluded that history of gastric disease correlated with acquiring the infection (Herbart, *et al.* 2001). It is very

unusual for people to know their HP status and, thus, it is unlikely that there is systematic bias that threaten the validity of our results.

This current study investigated the relation between blood groups and the occurrence of HP infections with regards to gender. For both sexes, blood groups B- and AB- showed very similar infection rates among both sexes with a very slight increase in males' infection rates. Meanwhile blood group O+ recorded the highest numbers of infections among female subjects, it also held the lowest infection rates among males. There was clear significance between the mean numbers of infected and non-infected male students in blood group AB+, while blood group O+ scored the highest level of infections, among females, followed by AB+. However, blood group AB+ showed a more significant difference between infected and uninfected rates. An Iraqi research found a significant association between ABO blood types and HP infection. The authors declared that type O had a greater tendency for infection while blood group AB had the least tendency for infection (Gaidaa Kadhum, *et al.* 2016). Their findings correspond with those from other researchers displaying greater susceptibility of type O to HP infections (Kanbay, *et al.* 2005; Mattos, *et al.* 2002). On the other hand, previous literature contrast with these results that showed that blood group O did not signify a risk factor for this infection (Seyda, *et al.* 2007; Sharara, *et al.* 2006). While, in some aspects, our results accord with these findings, they also conflict with them. Blood type O only seemed to increase infection susceptibility to females but not males. These contradictions are because, in this study, we assessed the effect of blood types on the acquisition of infection according to gender. In terms of Rh factor, a prior study stated that there were no significant differences between positive and negative individuals (Gaidaa Kadhum, *et al.* 2016), which coincides with our own verdicts as well as those of earlier literature (Petrovic, *et al.* 2011; Alo, 2013).

Although our studied population is small and narrowed, it may be representative of the general population, despite the differences between this group and the general population.

CONCLUSION

In conclusion, *H. pylori* infections are becoming more and more prevalent. Lifestyle, family history, educational level, family size, source of drinking water, smoking, consumption of tea and coffee, as well as gender had no effect on the seroprevalence of HP infections. However, age and blood type did seem to make some individuals more susceptible to infection.

Recommendation

Before definite facts can be stated, further research is required. More studies must be carried out to better understand the effect of gender, age and other factors on HP infections, particularly in students. Also, the mode of transmission of the MO is not yet established.

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