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Original Article

The Prevalence of Helicobacter pylori Infections among Blood Donors in Blood Bank of Zawia Teaching Hospital and the Assessment of Some Related Factors

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Abstract

Infection by the bacterium Helicobacter pylori is transmissible and is considered a public health issue which affects people of all ages. This study aims to investigate the prevalence of H. pylori infections among blood donors and to assess the correlation of different lifestyles with H. pylori infections in addition to considering the prevalence of infections among blood Donor in regards to age. This study was conducted at the blood bank at Zawia Hospital, Libya, from the first of March until the end of May 2021. One hundred male donors aged between 22-61years were included in the study. The results showed that 37 persons (37%) were positive for H. pylori, and the remaining 63 (63%) were negative. The highest level of infections was among cases aged (32– 41) with a total of 15 infections (40.54%). It can be concluded that infection with Helicobacter pylori is prevalent in asymptomatic people of Zawia city. The age and blood type did seem to make some individuals more susceptible to infection. A nationwide epidemiological study is warranted to determine the seroprevalence of Helicobacter pylori.

Key words: Helicobacter pylori, Donors, antibodies, IgG and IgM, sero-positivity.

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Introduction

Helicobacter pylori (H. pylori) is a public health issue, it represents one of the most common and medically important infections worldwide. H. pylori is Gram-negative, microaerophilic, spiral, motile bacterium that resides in the gastric pits and the overlying mucus blanked. (Versalovic, 2003) (Blaser, 1990). H pylori is recognized as the major cause of gastritis, gastric ulcer, duodenal ulcers, gastric adenocarcinoma and mucosa-associated lymphoid tissue (MALT) lymphoma. The prevalence of H pylori infection is 70%-90% in developing countries and 25%-50% in developed countries (Demiray et al., 2006). Person-to-person spread is the most common mode of transmission. Faecal-oral and oral-oral transmissions also have been reported (Allaker et al,2002). The prevalence of H-Pylori infection dependents on socio-economic conditions especially poverty, overcrowding, poor sanitation and hygiene.
Numerous diagnostic tests are available to detect H. pylori infection and are divided into either invasive (histology, rapid urea's test (RUT) and bacterial culture) or non-invasive tests (serology, 13C-urea breath test (13C-UBT), and stool antigen test) (Guarner et al., 2010). However, there has been no single test available that can be used as a standard to detect H pylori.
H. pylori cells portray rod morphology occurring in two subtypes: spiral and S-shaped. And findings from electron microscopy showed that long term cultures of the microorganism (MO) consist of alternative forms of coccoid cells, beside the classic spiral rods. Additional studies showed that even the coccoid forms can be divided into two types: viable but non-culturable cocci (VBnC) and a degenerative coccoid form, which is most likely because of cellular death. The morphological transformation from spiral to coccoid forms is brought under extreme and stress conditions, such as the presence of antibiotics (Rudnicka, et al. 2014). There is no evidence regarding the reversion from the coccoid form to the viable and infectious spiral state. H. pylori are lophotrichous bacteria containing four to six flagella. Hence, all gastric and enterohepatic Helicobacter species are vastly motile (Rust, et al. 2009).
Up to 20% of infected persons can develop one or more of the following squeals: Dyspepsia,Gastritis, Peptic ulcer disease,gastric adenocarcinomaandmucosal associated lymphoid tissue lymphoma (Venerito, 2015). for patients under the age of 55 years without serious symptoms (including haemorrhage, anaemia, unexplained weight loss, early satiety, dysphagia, odynophagia, recurrent vomiting, etc.), a "test and treat" strategy for eliminating H. pylori infection is recommended.

In addition,in early infection, H. pylori gastritis causes inflammation at the gastric antrum, especially, and later spreads proximally towards the stomach cardia and body. If not treated early, acute gastritis will progress into chronic gastritis. H. pylori is recurrently detected at the gastric antrum (Dursun, et al. 2004). In some cases, though, this MO can only be found in the stomach body, especially in the use of proton-pump inhibitors (PPI) or in the presence of atrophy or gastrointestinal metaplasia. In chronic inflammation, a loss of gastrin-producing G-cells and acid-producing parietal cells consequences in low acid

secretion and gastric atrophy with intestinal metaplasia (Väänänen, et al. 2003). The decline in hydrochloric acid secretion might reduce Gastroesophageal reflux disease symptoms and is hence it is advocated that H. pylori infection can protect against the development of oesophageal adenocarcinoma. Individuals with H. pylori-associated atrophic gastritis are regularly asymptomatic, but they are, however, at increased risk of developing gastric carcinoma (Yanaoka, et al. 2009). The prevalence of H. 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 (Alemayehu, 2011). A study carried out in Kuwait detected an infection rate of 81% (Ibrahim, et al. 1995). A similar study in Jordan reported an 86% infection rate, while 82% was found in another (Bani-Hani, et al. 2001). 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. 1994). 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 (Mirghani, et al. 1994).

Lastly, it is generally acquired in early childhood and is linked to various disorders of the upper GIT (Badawy, et al. 2017). An investigation carried out in Benghazi studying H. pylori infections in individuals with gastrointestinal illnesses in different areas of Libya, found a prevalence rate of 69.7% and 81% (Bakka, et al. 2009). 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 (Almehdawi, 2016). However, no such studies have been executed in the city of Zawia. Thus, this study aims to investigate the prevalence of H. pylori infections among blood donors at the blood bank at Zawia Hospital, Libya, also to assess the correlation of different lifestyles with H. pylori infections and to consider the prevalence of infections among blood Donor in regards to age.

Methods and Materials

This study carried out at the blood bank department of Zawia Teaching Hospital. Serological survey of *H. Pylori* IgG- and IgM-antibodies in sample collected from100 blood Donors, aged 22-61years. Gender seems to play an important role in blood donation, whereas, all participants in this study were male. The sample was collected from the first of March until the end of May 2021. All blood donor participated in the study were evaluated with a predesigned questionnaire, which was distributed at the blood bank. Each questionnaire contained a written permission section, where donors allowed for their information to be used in this study. Firstly, the questionnaire included some demographic characteristics of participants, which are; age, gender, occupation, marital status, family income, family size, residency and blood group. Then, some other questions related to the participant's lifestyle were included.

The method used for screening as 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. The result of rapid test was noted at each individual's questionnaire.

The collected data were entered into and analysed by the Statistical Package for the Social Sciences (SPSS) version 20. The mean and SD were examined with t-test. Logistic regression analysis was applied for the assessment of possible risk factors.

Results

During the three-months study period (March– May), a total of 100 cases were included in this study. The involved cases were 100% male. From the participants, 37 persons (37%) were positive for *H. pylori*, and the remaining 63 (63%) were negative. The prevalence of infections among the blood donors according to age results have been divided into age groups, the highest level of infections was among cases aged (32– 41) with a total of 15 infections (40.54%). While age group (22-31) had total of 10 cases (27.03%) and age group (42-51) had 8 cases (21.62%). While the age group (52-61) had only 4 infections (10.81%) (Table 1). On the other hand, the relationship between participants' lifestyles and Helicobacter pylori infections was not significantly associated as showed in table 2

Next, the correlation of H. pylori sero-positivity and blood groups was analysed (Table 3). blood group O- and A- showed very similar infection rate (5.41%) mean while blood group O+ recorded the highest number of infection (32.43%) while blood group A+ the second level of infection rate (27.03%). followed by B+ (18.92%) while blood group AB-, AB+, B- recorded the lowest infection rate. Clear significance is established between the mean numbers of infected and non-infected male blood donors in blood group O+. So, we found infection rate in blood group O+ 12 person from 37 donors (32.43%) followed A+ 10 person from 37 donors (27.03%).

Table 1 - seroprevalence of H. pylori according to age.

	Positive		**Negative**	
Age (years)	No.	%	No.	%
22-31	10	27.03	7	11.11
32-41	15	40.54	31	49.21
42-51	8	21.62	20	31.75
52-61	4	10.81	5	7.94
Total	37	100	63	100
Mean±SD.	25±12.36	9.25±4.57	25±19.28	15.75±12.15

Table 2 - Correlation of different lifestyles with Helicobacter pylori infections.				
	Positive		**Negative**	
	No.	%	No.	%
Count of Family Size				
2-5	21	56.76	39	61.90
6-9	13	35.14	23	36.51
10-13	3	8.11	1	1.59
Smoking				
Yes	20	54.05	30	47.62
No	17	45.95	33	52.38
Fast Food				
Yes	27	72.97	39	61.90
No	10	27.03	24	38.10
Tea/Coffee				
Yes	33	89.19	55	87.30
No	4	10.81	8	12.70
Monthly Income				
<1000	25	67.57	43	68.25
1500-2000	3	8.11	7	11.11
>2000	9	24.32	13	20.63
Water Source				
Tap	10	27.03	15	23.81
mineral	27	72.97	48	76.19
Taking Antibiotic or Antiacid				
Yes	9	24.32	12	19.05
No	28	75.68	51	80.95
Heredity				
Yes	6	16.22	10	15.87
No	31	83.78	53	84.13
Pain in Stomach				
Yes	14	37.84	19	30.16
No	23	62.16	44	69.84
Hand washing before eating				
Always	19	51.35	36	57.14
Usually	18	48.65	27	42.86

Table 3- Prevalence of H.pylori according to blood group

Blood Groups				
	Infected with HP		**Not infected**	
	No.	(%)	No.	**(%)**
A$^-$	2	5.41	3	**4.76**
A$^+$	10	27.03	18	**28.57**
AB$^-$	0	0.00	1	**1.59**
AB$^+$	3	8.11	0	**0.00**
B$^-$	1	2.70	1	**1.59**
B$^+$	7	18.92	10	**15.87**
O$^-$	2	5.41	2	**3.17**
O$^+$	12	32.43	28	**44.44**

Discussion

H. pylori are Gram-negative spiral bacteria colonising the human stomach (Buta, *et al.* 2010). It is linked with various serious gastrointestinal tract disorders, including mucosa-associated changes to lymphoma, and gastric cancers in adults (Parsonnet, 2006). 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 gastrointestinal tract disorders. However, none were accomplished in Zawia city, and only focused on Blood Bank in zawia hospital. 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 city of Zawia. The current study established an overall seroprevalence rate of 37%. A lower prevalence rate of 20 – 30% was found in healthy individuals in developed countries (Jones D.M., *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 the current study; 35% and 56.5% prevalence rates among the general population (Altyar, *et al.* 2015, Almehdawi, 2016). Dissimilarly, two additional studies in Libya found seroprevalence rates of 70.8%, among healthy persons (M. A. 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. In regards to age, this study found a highest rate of infections (40.54%) at age group (32-41), while infections decreased across the remaining age groups. A study performed in Tripoli concluded that the infections of H. pylori decreased with an advanced age (Almehdawi, 2016). These results are similar

to those found in Palestine and Ethiopia (Abu-Mugesieb, R. M, 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 (Altyar, *et al.* 2015). These findings go in line with those found in previous study (Tadesse, *et al.*2014). Furthermore, a Kuwaiti study determined a steady positive correlation between age and HP infections (Alazmi W.M., *et al.* 2014). The current study was limited by specific age groups that only include blood donors at the blood bank in the zawia hospital, and this may have affected the seroprevalence in respects to age, as no samples under the age of 22 nor over the age of 61 were collected. Low socioeconomic status was not associated with the prevalence of *H. pylori* infection in the studied population. but in this study it was (76.56%) from donors which was monthly income less than 1000 is have H.pylori infection , in agreement with a study conducted in Tripoli(Altyar.*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) and (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 (Moayyedi P., *et al.* 2002). Family size was also irrelevant in this study, as no correlation was detected but in this study the number of people families are highest infected with H.pylori (56.76%). Our findings are similar to those concluded by another research performed in Benghazi, which also found no correlation (Almehdawi, 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 *H. pylori, and* they showed higher significance in our study. Likewise, many other studies were similar to the current study; many blood donors have positive *H.pylori* infection were smokers (50.54%). Two studies conducted in Benghazi declared that smokers are not more likely to be infected than non-smokers (Almehdawi, 2016; Mohammad, M. A, *et al.* 2011). These findings contradict with another study in Tripoli that found a positive correlation between smoking and *H. pylori* infections (Altyar, *et al.* 2015), agreeing with the results of many other studies around the world (EUROGAST study group, 1993; Forman D, *et al.* 1993) the smoking cases an increasing stomach bacteria and play an important role in increasing stomach and ethnic ulcer and cigarette prevent the healing in stomach and increasing their complication that may reach the bleeding in digestive system. 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 (Almehdawi, 2016), while another study observed that drinking coffee was not associated with the infections (Almehdawi, 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 through this study the percentage from donor patient who drink mineral water it was (72.97%) higher than donor patient who drink tap water. Various studies contrast with our study as they did not find any relation between the water source and infection rates (Almehdawi, 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, M. A. *et al.* 2011). German research concluded that history of gastric disease correlated with acquiring the infection (Herbarth, *et al.* 2001). It is very unusual for people to know their HP status and, thus, it is unlikely that there are systematic biases 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 just for male sex, blood groups O- and A- showed very similar infection rates (5.41%) mean while blood group O+ recorded the highest number of infection rate (32.42%), and blood group AB- recorded the lowest infection rates. there was clear significance between the mean number of infected and non-infected male in blood group O+, while blood group A+ the second higher level of infection followed by B+. An Iraqi research compatible with our study 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 (Baqir, *et al.* 2016). Their findings correspond with those from other researchers displaying greater susceptibility of type O to H.Pylori 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. We observed that the blood group O+ is higher ability to infected H.pylori. in this study, we assessed the effect of blood types on the acquisition of infection according to ages. In terms of Rh factor, a prior study stated that there were no significant differences between positive and negative individuals (Baqir, *et al.* 2016), which coincides with our own verdicts as well as those of earlier literature (Petrovic, *et al.* 2011).

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

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

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