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Factors related to *H. pylori* infection in Nablus region: cross sectional analysis from west bank

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Abstract

H. pylori infection is common infection in developing countries and is associated with gastric and extra-gastric complications was not studied before in Occupied Palestinian territories. We wanted to measure the prevalence of *H. pylori* infection in a sample from Nablus region in West Bank and to study risk factors and clinical outcomes. We found that 122 patients who visited medical laboratories in Nablus were recruited to participate in the study. A questionnaire was collected from the study group on information that included; demographic variables, diseases history, blood groups. A sample of stool was collected and evaluated for *H. pylori* infection using *H. pylori* Antigen Test. SPSS software was used to perform statistical analysis of the study. 41.8% of the study participants had *H. pylori* infection. Patients without Diabetes mellitus type were less likely to have *H. pylori* infection (OR= 0.15(95% CI, 0.04, 0.60, p=0.008). Also, not having GI was associated with less *H. pylori* infection OR= 0.40, 95% CI, 0.39, 1.75, p=0.018). *H. pylori* infection was more common in patients with O blood group, but this did not reach statistical significance. Smoking and hygiene practices were not related to *H. pylori* infection. In conclusion, *H. pylori* infection is prevalent in Nablus and is associated with higher risk for Diabetes and GI problems.

Keywords: *H. pylori*. Peptic ulcer. Diabetes. Hygiene. Hypertension.

Introduction

Helicobacter pylori is a gram-negative bacteria that infects the stomach and is associated with gastrointestinal diseases including peptic ulcer, gastritis and gastric cancer. It is estimated that, the prevalence of *H. pylori* infection is 44% worldwide ranging from 50.8% in developing countries and 34.7% in developed countries. *H. pylori* infection is slightly more common among males and in adults older than 18 years [1]. The prevalence of *H. pylori* infection among studied group in Northern Lebanon which is adjacent to Palestinian territories was reported to be 52.4% [2].

The transmission of *H. pylori* infection happens mainly through contaminated water and food through oral fecal route, but also transmission through oral oral route is possibility [3]. The induction of different gastric clinical outcomes is related to myriad of many factors including virulence factors, environmental factors and genetic factors [4]. However, *H. pylori* infection is associated with extra-gastric diseases as was shown by Mendall et al in 1994 [5]. Among the many extra-gastric outcomes associated with *H. pylori* infection there is metabolic, cardiovascular and neurological consequences [6].

Many factors are related to *H. pylori* infection including lower socioeconomic status, older age, smoking and hygiene practices [7]. Some studies indicated higher prevalence of *H. pylori* infection in indigenous populations and rural area [8]. Palestinian territories are occupied lands of indigenous Palestinian people [9]. Ethnic differences were reported between Jews and Arab citizen of Israel response to antibiotic response of *H. pylori* infection to antibiotic treatment [10].

Notably, emerging evidence indicates association between type of red blood cells group and *H. pylori* infection. *H. pylori* infect gastrointestinal (GI) lining that produces carbohydrates. ABO and Lewis histo-blood group is controlled by glycosyltransferase which in turn affects type of carboydrates produced in GI mucosa and exocrine secretions. It also affects glycosylation of proteins and lipids in human GI tract which enhances potential *H. pylori* adherence to possible receptors [11]. O blood group was shown to be more prone to *H. pylori* infection, whereas rhesus factor was not related to *H. pylori* infection [12].

Very few studies in Palestine addressed *H. pylori* infection and associated factors. Hence the goal of this study is

1) To evaluate various demographic, hygiene factors in relation to *H. pylori* infection
2) To evaluate the cross sectional association between *H. pylori* infection with some gastric and extra-gastric clinical outcomes
3) To evaluate if ABO blood groups differ in prevalence of *H. pylori* infection.

Methodology

A total of 122 patients whom attend medical laboratories in Nablus city for *H. pylori* stool antigen test were enrolled in this study. After obtaining the written consent of those who agreed to participate in the research, some information was collected from them by filling out a special questionnaire. The questionnaire included demographic data and some questions related to the presence of certain symptoms such as stomach ache and heartburn. The participants were also asked about their blood group and whether they had diabetes or hypertension and other diseases. Their test results for *H. pylori* stool antigen test were recorded.

This test is based on the detection of *H. pylori* antigen in the stool, as it is immunochromatographic test. A small portion of stool sample was mixed well with an extraction solution in a small tube, before adding three small drops of the solution to the sample well of the test device (DIAQUICK *H. pylori* Stool Cassette, Austria). The cassette containing specific monoclonal antibodies against *H. pylori*. The result is considered positive if two colored lines appear in control and test areas on the cassette, and considered negative if only one colored line appears in the control area on the cassette. The test result should be read within 30 minutes after the addition of the sample. The test is considered invalid and must be repeated if the control line doesn't appear.

Statistical Analysis

Proportions of study variables were calculated for different categories. Chisquare test was calculated to compare *H. pylori* infection among blood groups. Logistic regression was run to study association between lifestyle factors, clinical outcomes and *H. pylori* infection adjusting for age, gender and place of residence. STATA 17 software was used.

Results

This study included 122 individuals from Nablus region and for analysis involving Type of RBC group we only included 69 individual in the analysis. Table 1 provides description of the study group. The age of most of study participants ranged from 21-50 y. Both males and females and city and village were represented equally in this study. 41.8% participants in this study had *H. pylori* infection. Most of the study participants performed hygiene practices such as not sharing soap, washing vegetables and hands. 11.5% and 8.2% of the study participants had T2DM and HTN respectively. More than half of the study participants had GI health problems including gastric and intestinal problems (Table 2).

Table 1: Descriptive frequency and proportions of study variables.

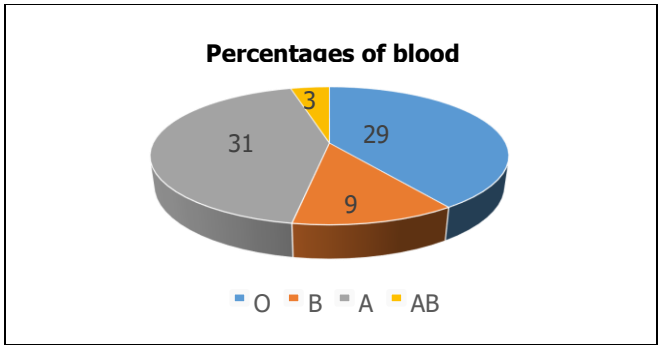
Variable	N (%)
***H. pylori* Infection**	
Yes	51 (41.8%)
No	70 (57.4%)
Demographic Variables	
Age	
0-10 y	2 (1.6%)
11-20 y	14 (11.5%)
21-30 y	45 (36.9%)
31-40 y	27 (22.1%)
41-50 y	26 (21.3%)
51-60 y	7 (5.7%)
61-70 y	1 (0.8%)
Gender	
Male	62 (50.8%)
Female	60 (49.2%)
Place of residence	
City	63 (51.6%)
Village	59 (48.4%)

Lifestyle Habits	
Smoking	
Yes	50 (41.0%)
No	72 (59.0%)
Soap Sharing	
Yes	19 (15.6%)
No	103 (84.4%)
Washing vegetables	
Yes	109 (89.3%)
No	13 (10.7%)
Hand Washing	
Yes	114 (93.4%)
No	8 (6.6%)
Psychological Health Issues	
Yes	44 (36.1%)
No	78 (63.9%)
Chronic Diseases	
Diabetes	
Yes	14 (11.5%)
No	108 (88.5%)
Hypertension	
Yes	10 (8.2%)
No	112 (91.8%)
GI Diseases	
Gastric problems	
Yes	63 (51.6%)
No	59 (48.4%)
Other GI problems	
Constipation	39 (32.0%)
Diarrhea	19 (15.6%)
None	52 (42.6%)
Both diarrhea and constipation	12 (9.8%)
Family History	
Yes	22 (18.0%)
No	103 (84.4%)

Source: Own authorship.

As Figure 1 represents, most of the study participants had O or A RBC group, with very few having B or AB blood groups. *H. pylori* infection was most common among O blood group relative to other groups, but this did not reach statistical significance. Only 4 out of 72 of *study participants had negative rhesus factor in RBC, although there was no significant* relationship to *H. pylori* infection, the small number may not have allowed for assessing relationship.

Figure 1. Percentages of blood groups.



Source: Own authorship.

In multiple adjusted model for age, gender and living place as shown in Table 2, *H. pylori* infection was significantly related to T2DM and presence of general GI problem. However, *H. pylori* infection was not related to age, gender, living place, specific GI problems, hygiene practices or psychological health conditions (Table 3).

Table 2. Distribution of proportions between ABC blood groups.

	H.Pylori	
	Yes	**No**
Blood Group		
A	10 (32.3%)	21 (67.7%)
B	4 (44.4%)	5 (55.6%)
O	14 (48.3%)	15 (51.7%)

Chi-square= 1.66, p= 0.44. Source: Own authorship.

Table 3. Multiple logistic regression association between *H. pylori* infection and study risk factors and clinical outcomes.

Variable	OR (95% CI)	p-value
Lifestyle Habits		
Smoking		
Yes	Ref	0.66
No	0.82 (0.33, 2.04)	
Soap Sharing		
Yes	Ref	0.79
No	0.87 (0.32, 2.38)	
Washing vegetables		
No	Ref	
Yes	2.4 (0.70, 7.9)	0.16
Hand Washing		
No	Ref	
Yes	0.73 (0.17,3.24)	0.68
Psychological Health Issues		
Yes	Ref	
No	0.95 (0.44, 2.06)	0.899
Chronic Diseases		
Diabetes		
Yes	Ref	
No	0.15(0.04, 0.60)	0.008
Hypertension		
Yes	Ref	
No	1.14 (0.27, 4.78)	0.85
GI Diseases		
Yes		
No	0.40 (0.39, 1.75)	0.019
Gastric problems		
Yes		
No	0.59 (0.20, 1.75)	0.34
Other GI problems		
Constipation	Ref	
Diarrhea	1.2 (0.32, 4.61)	0.77
None	0.4 (0.1, 2.0)	0.26
Both diarrhea and constipation	1.12 (0.31, 4.06)	0.86
Blood Groups		
A		
B	1.89(0.65, 5.53)	0.25
O	1.31(0.28, 6.19)	0.73
Rhesus		
+	Ref	
-	2.86 (0.27, 30.01)	0.38

Source: Own authorship.

Discussion

In this study in Nablus region in different age groups, there was high prevalence of *H. pylori* infection. *H. pylori* infection was not different across age groups, gender groups or between urban versus rural areas. Very few participants did not apply hygiene practices and hence we could not find association between hygiene practices and *H. pylori* infection. Clinical outcomes of *H. pylori* infection included T2DM and GI health problems, but not hypertension.

Interestingly, O blood group seemed to be associated with higher *H. pylori* infection but more participants are needed to clarify the relationship. At the same time we were unable to find enough participants to identify if rhesus factor is linked to *H. pylori* infection.

The prevalence of *H. pylori* infection in this study group was slightly lower than 50%. This is matching the high prevalence of *H. pylori* infection in developing countries [1] with decline in rate of infection being reported in North America and Western Europe, but a matching decline is not happening in developing countries [13]. Most of infected individuals will develop some form of ulceration in GI, smaller proportion develops (17%) peptic ulcer and some of those may develop complication of ulcer or gastric cancer [14]. In some countries of Middle East such as Turkey, infection rate among older age group (60-69 y) reached 100% [15]. Factors that enhance *H. Pylori* infection includes lower socioeconomic status, lower sanitation, crowded living conditions, smoking, use of nonsteroidal anti-inflammatory drugs, O blood group and higher BMI and GI disease history[16].

In our study, age was not identified as a risk factor for *H. pylori* infection, may be because the age in our group was more homogenous and representative of younger and middle aged adults. At the same time contrary to what was shown before, living in villages was not associated with significant relationship relative to urban area [8]. Rural areas in Palestine tend to rely more natural water resources such as springs water with current shortage of fresh water in Occupied Palestinian territories, this needs more studies to elucidate how this could affect the prevalence of *H. pylori* infection [17].

Peptic ulcer is manifested as peptic injury of digestive tract which involves damage to mucosal area reaching the submucosa affecting mainly stomach and proximal duodenum, but may affect other parts of GI, with prevalence of 5-10% in developed countries. This is a condition that increased *H. pylori* infection and is sometimes associated with complications such as GI bleeding and mortality [18]. Peptic ulcer is not well studied in Occupied Palestinian territories and as shown in Table 1, half of our study participants indicated having gastric problems. Unfortunately, due to limited funding of our work we could not confirm the peptic ulcer cases in our study group which highlights the importance of performing more studies.

It was founded a significant association between T2DM occurrence and *H. pylori* infection. It was suggested that this is temporal association given that *H. pylori* infection starts at childhood, whereas T2DM is manifested at middle age. Until, now the pathogenesis of *H. pylori* infection in T2DM is not fully clear, but could be justified by the fact that *H. pylori* infection is associated with increase in inflammation [19]. Also, there is conflicting work on the modulation of leptin and ghrelin which regulate energy homeostasis by *H. pylori* infection [20] also, it was shown that H. pylori infection may be related to hepatic insulin resistance [19].

On the other hand, HTN was not significantly related to *H. pylori* infection in contrast to what was previously show in other population . HTN is a major risk factor for cardiovascular diseases and cerebrovascular disease and is associated with obesity which could be increased by *H. pylori* infection [21]. In meta-analysis done by A group of people who received treatment for *H. pylori* infection had lower risk of mortality due to cerebrovascular diseases (0.46 (0.26-0.81), p=0.007) [21].

There was no significant association between reported psychiatric illness and *H. pylori* infection, probably due to small number of participants with psychiatric illness, or the sensitivity of reporting this health condition among Palestinian society. *H. pylori* infection is associated with decrease in vitamin B12 absorption, the decline of which is associated with accumulation of homocysteine. Also, atherosclerosis of blood capillaries may happen increasing the risk of neurological symptoms[22].

H. pylori infection was more common in O blood group, but this did not reach statistical significance, this could be related to the relationship between ABO blood group and glycosylase enzyme function [11]. There was a 16.3% increase in odds of *H. pylori* infection in subjects with O blood group and protection from infection in adults with B and AB blood groups in meta-analysis done by Chakarani et al [23].

The present study was the first study to address the *H. pylori* infection and clinical outcomes in the Palestinian society. It was included a sample of Palestinian people from different age groups living in urban and rural region of Nablus. Our study is not without limitation including being only done in Nablus region, the small sample number and relying on self-reported for health conditions. Also, our study is cross sectional in design and so temporal relationships cannot

be inferred. In a group of Palestinian people from Nablus, there was high prevalence of *H. pylori* infection which was not significantly related to age or area of residence. Very few number of participants did not apply hygiene practices and hence it was hard to identify the role of hygiene in this case, given that this was self reported, we could not preclude bias in this regards. *H. pylori* infection was more common in O blood group, but this did not reach statistical significance. With regards to health outcomes, *H. pylori* infection was more common in patients with T2DM and GI problems. We recommend more focused study on the aspect of *H. pylori* infection and health programs to lower its prevalence.

CRediT

Author contributions: **Conceptualization -** Duha Najajra, Mahdi Awwad, Nihal Natour, Lubna Kharraz, Mohammad Alnees; **Data curation -** Duha Najajra, Mahdi Awwad, Nihal Natour, Lubna Kharraz, Mohammad Alnees; **Formal Analysis -** Duha Najajra, Mahdi Awwad, Nihal Natour; **Investigation -** Duha Najajra, Mahdi Awwad, Nihal Natour, Lubna Kharraz, Mohammad Alnees; **Methodology -** Lubna Kharraz, Mohammad Alnees; **Project administration -** Mohammad Alnees; **Supervision -** Duha Najajra, Mahdi Awwad; **Writing - original draft -** Duha Najajra, Mahdi Awwad, Nihal Natour, Lubna Kharraz, Mohammad Alnees; **Writing- review & editing-** Duha Najajra, Mahdi Awwad, Nihal Natour, Lubna Kharraz, Mohammad Alnees.

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