Relation between Helicobacter Pylori Infection and Blood Group in Patients with Peptic Ulcer

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Abstract

Background: **In industrialized nations, 20 to 50% of people have H pylori, whereas in developing nations, 80% of people have the infection. Globally, H. pylori is a major source of disease and death. A number of disorders, including iron deficiency anemia, pancreatic cancer, gastritis, stomach ulcers, and gastric cancer, have been linked to H. pylori infection, according to numerous recent research.**

Aim of the work: **Reveal the prevalence of H. pylori infection in patients with stomach pathology and figure out the connection between those patients' H. pylori infection and their blood types (Lewis and ABO).**

Patients and methods: **This descriptive observational study involved 66 patients with a range of gastrointestinal symptoms who visited the endoscopy unit at Al-Hussin University Hospital. All of the participants in the study had gastric biopsy cultures for H pylori. All patients also had stool H pylori Ag, Lewis factor, ABO, and Rh tests performed.**

Results: **The study was conducted on 66 patients; 40 patients (60.6%) were positive for H pylori by gastric biopsy culture. Fast food outdoor eating, blood group O, blood group B, and Lewis B were predictive for positive gastric biopsy culture. Rifampicin, Levofloxacin, ofloxacin, and tetracycline gave the best sensitivity results compared to amoxicillin, metronidazole, and clarithromycin.**

Conclusion: **The study validates the link between blood group and H. pylori infection. Individuals with blood group O and Lewis factor B should exercise extra caution to prevent the illness from spreading since they have a higher risk of developing gastritis, ulcers, as well as punctures.**

Keywords: pylori; ABO; Lewis factor

1. Introduction

A gram-negative bacillus called Helicobacter pylori, or H. pylori, frequently colonizes the stomach of humans.[1] Twenty to fifty percent of people in wealthy nations and eighty percent of those in developing nations have it.[2] The ABO system is the most essential group of blood systems for human transfusions. Red blood cell blood group antigens serve as enduring, stable, and distinctive biological markers that are nearly as distinctive as fingerprints for each person.[3] It is becoming more and more clear that ABO antigens have biological importance in addition to their clinical value for transfusion and transplantation. These antigens may be linked to a propensity to or protection from a variety of disorders.[4] Gastric cancer, which is more common in group A persons, and stomach ulcers, which are more common in group O individuals, have been linked to the ABO phenotype.[5] Additionally, the Lewis antigen

expression on the H. pylori membrane for antigenic mimicry may lead to the bacteria's continued colonization and survival in the stomach mucosa. Furthermore, the stomach mucosa's production of Lewis b (Leb) antigens may function as a type of receptor for bacterial adherence. The blood group, antigen b-binding adhesion (babA) on the outer membrane of Helicobacter pylori, has a significant role in the bacteria's sustained colonization through attachment to Leb antigens on the stomach mucosa.[6] The increased incidence of chronic gastritis and gastric cancer in O blood group phenotypic and secretors (expressing Leb antigen) is likely explained by H. pylori binding to H and Leb antigens in the gastric mucosa.[7]

The objective of this study was to document the frequency of H. pylori infection in individuals with gastrointestinal disorders and to establish the correlation between the ABO and Lewis blood types and H. pylori infection in these patients.

2. Patients and methods

From December 2018 to September 2022, the study was carried out in the Al-Hussein University Hospital's Endoscopy Unit of the Internal Medicine Department. There were 66 patients in all that were investigated. Each patient provided a sample of their blood, feces, and stomach biopsy specimen. Before the samples were collected, The individuals above had ceased the usage of H2 receptor antagonists, protons pump inhibitors, non-steroidal anti-inflammatory treatments, and antibiotics for a minimum duration of two weeks. The following will be applied to every patient: Laboratory studies: Ag produced by Helicobacter pylori, blood types ABO, Rh, and Lewis. Bacterial culture: H. pylori was grown on certain media using gastric biopsy samples. Testing for antibiotic sensitivity.

2.1.STATISTICAL ANALYSIS

The data was analyzed using SPSS version 24, a statistical program specifically designed for social science research. The mean ± standard deviation (SD) was employed to convey quantitative data. Qualitative data was expressed using frequency and percentage. The mean, also known as the average, is the middle value of a discrete set of integers. It is calculated by dividing the sum of all the values by the total number of values. The standard deviation, also known as the SD, is the measure of dispersion for a set of data. A low standard deviation (SD) indicates that the values are often close to the mean, whereas a high SD indicates that the values are spread out throughout a wider range.

The tests listed below were carried out:

Shapiro-Wilk and Kolmogorov-Smirnov tests were employed to examine the normality of quantitative data.

The independent-sample t-test of significance was used to compare two means (for properly distributed data).

A chi-square test was used to compare non-parametric data.

Using multivariate logistic regression analysis, risk factors that were associated with a positive stomach biopsy culture were found.

Probability (P-value): P-values less than 0.05 were regarded as significant, P-values less than 0.001 as extremely significant, and P-values greater than 0.05 as inconsequential.

3. Results

There were 66 patients in the trial. A minimum age was twenty-one and maximum age was fifty years old were seen in all the patients under study, with a mean age of 35.5 ± 7.8 years. Regarding sex, the patients under study included 28 men (42.4%) and 38 women (57.6%). There were 20 smoking patients (30.3%), 25 patients

(37.9%) preferring fast food outdoor eating and 25 patients (37.9%) with known family history in the studied patients. The most common complaint was epigastric pain in 63 patients (95.5%) followed by nausea in 55 patients (83.3%) and vomiting in 45 patients (68.2%) while there were no cases with hematemesis or melena in the studied patients. As regard ABO blood grouping system, the most common blood group in the studied patients was blood group O in 28 patients (42.4%) followed by blood group A in 22 patients (33.3%) and blood group B in 13 patients (19.7%) while least blood group in the studied patients was AB blood group in 3 patients (4.%). As regard Rh blood grouping system, there were 59 Rh+ patients (89.4%) and 7 Rh – patients (10.5%) in the studied patients. As regard Lewis factor blood grouping system, Among the patients under study, the most prevalent phenotype was Le (a-, b+) in 27 patients (40.9%) while there were 17 patients (25.8%) of Le (a-, b-) phenotype, 10 patients (15.2%) of Le (a+, b-) phenotype and 12 patients (18.2%) of Le (a+, b+) phenotype. The H pylori Ag in stool was done and it was positive in 47 patients (71.2%). Gastric biopsy culture revealed that 40 patients (60.6%) were positive for H pylori. Table 1.

Table 1. A description of the data examined in each case under study.

		STUDIED PATIENTS (N = 66)	
SEX	Male	28	42.4%
	Female	38	57.6%
AGE (YEARS)	Mean ±SD	35.5 ± 7.8	
	Min - Max	21 – 50	
RISK FACTORS	Smoking	20	30.3%
	Fast food outdoor eating	25	37.9%
	Known family history	25	37.9%
COMPLAIN	Epigastric pain	63	95.5%
	Nausea	55	83.3%
	Vomiting	45	68.2%
	Hematemesis or melena	0	0%
ABO	A	22	33.3%
	B	13	19.7%
	O	28	42.4%
	AB	3	4.5%
RH	Rh+	59	89.4%
	Rh-	7	10.6%
LEWIS FACTOR	Le (a+, b-)	10	15.2%
	Le (a-, b+)	27	40.9%
	Le (a+, b+)	12	18.2%
	Le (a-, b-)	17	25.8%
STOOL H PYLORI AG	Negative	19	28.8%
	Positive	47	71.2%
GASTRIC BIOPSY CULTURE RESULTS	Negative for H pylori	26	39.4%
	Positive for H pylori	40	60.6%

Using multivariate logistic regression analysis, Table 2 demonstrates that the following factors were predictive for positive gastric biopsy culture: Fast food outdoor eating (B = 1.33, SE = 0.59, p =

0.024, odds = 3.8 & 95% CL = 1.19 – 12.1). Blood group B (B = -1.5, SE = 0.66, p = 0.02, odds = 0.21 & 95% CL = 0.05 – 0.77). Blood group O (B = 1.4, SE = 0.56, p = 0.013, odds = 4.07 & 95% CL = 1.35 – 12.2). Lewis B (B = 1.2, SE = 0.52, p = 0.022, odds = 3.3 & 95% CL = 1.18 – 9.3).

Table 2. Factors predicting a positive gastric biopsy culture using multivariate logistic regression analysis.

	B	SE	P-VALUE	ODDS	95% CL	
AGE	0.05	0.03	0.118	1.05	0.98	1.12
SEX	-0.26	0.51	0.6	0.764	0.27	2.08
SMOKING	-0.33	0.54	0.540	0.71	0.24	2.07
FAST FOOD OUTDOOR EATING	1.33	0.59	0.024	3.8	1.19	12.1
FAMILY HISTORY	-0.04	0.51	0.937	0.96	0.34	2.6
BLOOD GROUP A	-0.09	0.53	0.859	0.9	0.3	2.5
BLOOD GROUP B	-1.5	0.66	0.02	0.21	0.05	0.77
BLOOD GROUP AB	-1.17	1.25	0.346	0.3	0.02	3.5
BLOOD GROUP O	1.4	0.56	0.013	4.07	1.35	12.2
RH	0.8	0.81	0.319	2.2	0.45	10.9
LEWIS A	-0.65	0.53	0.215	0.51	0.18	1.5
LEWIS B	1.2	0.52	0.022	3.3	1.18	9.3

Regarding the relationship between the results of the gastric biopsy culture and the data analyzed, Table 3 reveals that patients with positive cultures (19 patients, 47.5%) had a statistically significant (p-value = 0.02) higher percentage of fast food outdoor eating than patients with negative cultures (5 patients, 19.2%).   ABO was shown to be statistically significantly different in patients with positive cultures compared to those with negative cultures (p-value = 0.022).   In addition, there was a statistically significant difference (p-value = 0.003) in the Lewis factor between patients with positive and negative cultures. In terms of Rh, there was no statistically significant difference (p-value = 0.309) between patients with positive cultures and those with negative cultures. Regarding age, sex, and family history, there was no statistically significant difference (p-value > 0.05) between patients with positive and negative cultural backgrounds.

Table 3. relation between Gastric biopsy culture result and studied data

		CULTURE RESULT				STAT. TEST	P-VALUE
		Negative (N = 26)		Positive (N = 40)			
AGE (YEARS)	Mean	33.6		36.8		T = 1.5	0.117
	±SD	7.6		7.8			NS
SEX	Male	10	38.5%	18	45%	X² = 0.27	0.599 NS
	Female	16	61.5%	22	55%		
RISK FACTORS	Smoking	9	34.6%	11	27.5%	X² = 0.37	0.539 NS
	Fast food outdoor eating	5	19.2	19	47.5%	X² = 5.4	0.02 S
	Known family history	10	38.5%	15	37.5%	X² = 0.01	0.937 NS
ABO	A	9	34.6%	13	32.5%	X² = 9.5	0.022 S
	B	9	34.6%	4	10%		
	O	6	23.1%	22	55%		
	AB	2	7.7%	1	2.5%		
RH	Negative	4	15.4%	3	7.5%	X² = 1.03	0.309 NS
	Positive	22	84.6%	37	92.5%		
LEWIS FACTOR	Le (a+, b-)	4	15.4%	6	15%	X² = 14.2	0.003 S
	Le (a-, b+)	3	11.5%	22	55%		
	Le (a+, b+)	7	26.9%	5	12.5%		
	Le (a-, b-)	12	46.2%	7	17.5%		

Table 4 demonstrates how patients with positive cultures might be described as having antibiotic sensitivity. Amoxicillin was of moderate effect in 2 patients (5%) and resistant in 38 patients (95%) with no sensitive effect in any studied patient. Rifampicin was of moderate effect in 4 patients (10%) and sensitive in 36 patients (90%) with no resistant effect in any studied patient. Tetracycline was of moderate effect in 10 patients (25%), sensitive in 28 patients (70%) and resistant in 2 patients (5%). Metronidazole was of moderate effect in 2 patients (5%) and resistant in 38 patients (95%) with no sensitive effect in any studied patient. Levofloxacin was of moderate effect in 2 patients (5%) and sensitive in 38 patients (95%) with no resistant effect in any studied patient. Ofloxacin was of moderate effect in 2 patients (5%) and sensitive in 38 patients (95%) with no resistant effect in any studied patient. Eight patients (20%) responded moderately to nitrofurantion, 28 patients (70%) were sensitive, and 4 patients (10%) were resistant. Eight patients (20%) responded moderately to clarithromycin, 24 patients (60%) were sensitive, and 8 patients (20%) were resistant

Table 4. description of antibiotic sensitivity results in patients with positive culture.

POSITIVE CULTURE PATIENTS (N = 40)	SENSITIVITY RESULTS					
	Sensitive		Moderate		Resistant	
Amoxicillin	0	0%	2	5%	38	95%
Rifampicin	36	90%	4	10%	0	0%
Tetracycline	28	70%	10	25%	2	5%
Metronidazole	0	0%	2	5%	38	95%
Levofloxacin	38	95%	2	5%	0	0%
Ofloxacin	38	95%	2	5%	0	0%
Nitrofurantion	28	70%	8	20%	4	10%
Clarithromycin	24	60%	8	20%	8	20%

ANTI-BIOTICS

4. Discussion

Sixty-six people were evaluated; 42.4% of the people were men, and 57.6% were women. With a mean (±SD) of 35.5 ± 7.8 years, the age range covered was 21 to 50 years. As regards H.pylori infection, it was identified by stool antigen test in 47 patients (71.2%) of the subjects; however, gastric biopsy culture revealed positive H.pylori growth in 40 patients (60.6%) of the studied patients. This result was concordant with Jaff [8], which studied 718 seropositive patients (64.8%) out of a total of 1108 studied patients. Also, the results were concordant with Aryana et al.[9], which studied 135 dyspeptic patients using the Heliprobe 14C-urea breath test and found that 68 (50.4%) patients were positive for H. pylori infection, 54 (40%) patients were negative and 13 (9.6%) patients had borderline results.

As regards the relation between gastric biopsy results and studied demographic data, our study demonstrated that there:

Compared to patients with negative cultures (5 patients, 19.2%), patients with positive cultures (19 patients, 47.5%) had a significantly (p-value = 0.02) higher rate of fast food outside eating. This outcome did not align with Valliani et al.,[10]. The study found that there was no statistically significant difference in preferred eating behaviors between the two groups of H. pylori positive and H. pylori-negative patients (p-value = 0.82). Of these, 41.7% of H. pylori-positive patients preferred outdoor dining, while 58.3% of H. pylori-negative patients shared this preference.

ABO-related clinically significant differences (p-value = 0.022) among patients with positive and negative cultures. Blood group O was more common in H.pylori negative patients than in H.pylori positive patients, at 23.1%, while blood group AB was more common in H.pylori negative patients than in H.pylori positive patients, at 7.7% versus 2.5%. The prevalence of the B blood group was more common in H.pylori-negative patients than in H.pylori-positive patients, at 34.6% versus 10% in H.pylori-positive patients. This outcome was consistent with Valliani et al.[10] Results showed that, with regard to the ABO blood group, there was a statistically significant distinction (p-value = 0.047) between H. pylori-positive patients and H. pylori-negative patients. Valliani et al.,[10] revealed that the prevalence of blood group O was 33.3% in H.pylori negative patients vs. 61.1% in H.pylori positive patients, the prevalence of blood group AB was 5.3% in H.pylori negative patients vs 2.8% in H.pylori positive patients, and the prevalence of blood group B was 19.3% in H.pylori negative patients vs 5.6% in H.pylori positive patients.

There was no discernible difference in Rh between patients with positive cultures and those with negative cultures (p-value = 0.309). In H. pylori-negative patients, the prevalence of RH+ patients was 84.6%, but in H. pylori-positive patients, it was 92.5%. These outcomes were consistent with those of Valliani et al.[10] Results showed that 33 patients (91.7%) of the 36 H. pylori-negative patients were RH+ patients, and 51 patients (89.5%) of the 57 H. pylori-positive patients were RH+ patients.

Lewis factor differences between patients with positive and negative cultures are statistically significant (p-value = 0.003). Le a+, b-prevalence was 15.4% in H. pylori-negative patients compared to 15% in H. pylori-positive patients; Le a-, b+prevalence was 11.5% in H. pylori-negative patients compared to 55% in H. pylori-positive patients; Le a+, b+prevalence was 26.9% in H. pylori-negative patients compared to 12.5% in H. pylori-positive patients; and Le a-, b-prevalence was 46.2% in H. pylori-negative patients compared to 17.5% in H. pylori-positive patients. This outcome did not align with Aryana et al.[9], which showed that the prevalence of Le (a+, b-) was 14.8% in H. pylori-negative patients vs. 14.7% in H. pylori-positive patients; the prevalence of Le a-, b+ was 53.7% in H. pylori-negative patients vs. 54.4% in H. pylori-positive patients; the prevalence of Le a+, b+ was 9.3% in H. pylori-negative patients vs. 7.4% in H. pylori-positive patients; and the prevalence of Le a-, b-was 22.2% in H. pylori-negative patients vs 23.5% in H. pylori-positive patients. Since we only looked at 66 people overall, the variation in the results could be the result of differences in the total number of patients evaluated. Aryana et al.[9] studied 122 patients.

Multivariate logistics regression analysis revealed that the following factors were connected to a positive stomach biopsy culture: fast food consumption outdoors, Blood groups B and O, and Lewis B.

As regards antibiotic sensitivity results in patients with a positive culture, our study demonstrated the following: Amoxicillin had a moderate effect in 2 patients (5%) and was resistant in 38 patients (95%), with no sensitive effect in any studied patient. Rifampicin had a moderate effect in 4 patients (10%) and was sensitive in 36 patients (90%) with no resistant effect in any studied patient. Tetracycline had a moderate effect on 10 patients (25%), was sensitive in 28 patients (70%), and was resistant in 2 patients (5%). Metronidazole had a moderate effect in 2 patients (5%) and was resistant in 38 patients (95%), with no sensitive effect in any studied patient. Levofloxacin had a moderate effect in 2 patients (5%) and was sensitive in 38 patients (95%), with no resistant effect in any studied patient. Ofloxacin had a moderate effect in 2 patients (5%) and was sensitive in 38

patients (95%), with no resistant effect in any studied patient. Nitrofurantoin was sensitive in 28 patients (70%) and resistant in 4 patients (10%), with a moderate effect in 8 individuals (20%). Clarithromycin had a moderate effect in 8 patients (20%), was sensitive in 24 patients (60%), and was resistant in 8 patients (20%). These results were concordant with that of Kouitcheu Mabeku et al.,[11] which stated that Amoxicillin was resistant in 97.1% of studied patients, Metronidazole was resistant in 97.8% of studied patients, Clarithromycin was resistant in 13.5% of studied patients, Rifampicin, Levofloxacin and Ofloxacin were resistant in 0% of studied patients and Tetracycline was resistant in 2.8% of studied patients.

4. Conclusion

The study validates the link between blood group and H. pylori infection. Individuals with blood group O and Lewis factor B should exercise extra caution to prevent the illness from spreading since they have a higher risk of developing gastritis, ulcers, and punctures. We further advise that identified factors exercise caution to prevent the spread of H. pylori infection in light of the study's findings. More research is necessary to investigate this matter in greater detail.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Conflicts of interest

There are no conflicts of interest.

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