

# Correlation between Blood Group Phenotypes and Incidence of *Helicobacter pylori* Infection

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## Abstract

**Introduction:** *Helicobacter pylori* is a gram-negative, spiral and flagellated bacteria. This infection might be present in more than 50 percent of people in the world. It has been found for several years that gastric carcinoma occur more frequently in patients with blood group A, while duodenal ulcer had been associated with blood group O.

**Methodology:** This is a prospective randomized controlled study in which patients who were newly diagnosed with *H. pylori* infections included. Sixty-one, selected Iraqi patients were (37 female and 24 male), with age ranges between (17-70) years. The Patients who enrolled in this study were divided according to (ABO-Blood groups) into four groups. Data were collected from the patients through direct interview included the age, gender, history of the disease, blood group, and Rhesus (Rh) factor.

**Results:** In this study the largest proportion (42.62%) of *H. pylori* infected patients according to ABO phenotypes was found in blood group O, and the smallest proportion (8.2%) was in blood group AB. Though the mean age of *H. pylori* infected patients in blood group O was higher than the other blood groups and less mean age was in blood group B. The female patients exhibited greater percentages of *H. pylori* infection than males for blood groups A, blood groups B, and blood group AB except for O blood groups patients where proportion of male was more than female. On the other hand the percentage of *H. pylori* infected patients in this study according to Rh factor distributed as follow: in +Rh factor (78.69%) and -Rh factor (21.31%).

**Conclusion:** The incidence of *H. pylori* infection is high in patients with blood group O so, the blood group phenotypes may play a role in *H. pylori* infection. Meanwhile there was no correlation between age, and Rh status with distribution of *H. pylori* infection among different ABO phenotypes patients. However, larger sample size is needed to further clarify this association.

**Keywords:** *Helicobacter pylori*, ABO phenotypes, age, Rh factor.

## Introduction

*Helicobacter pylori* (*H. Pylori*) is a gram-negative, coiled and flagellated bacteria<sup>[1]</sup>. It's usually colonized the stomach mucosa and has a significant etiologic role in gastric diseases for example; chronic gastritis, peptic ulceration (90% of duodenal ulcers and 70% of

gastric ulcers) and gastric cancer<sup>[2]</sup>. *Helicobacter pylori* infection might be present in more than fifty percent of the people in the world<sup>[2]</sup>.

It has been found for several years that gastric carcinoma occur more frequently in patients with blood group A, while duodenal ulcer had been associated with blood group O; however there is no clear reason for this relationship<sup>[3]</sup>. Previously, it has been shown that there is association between infection by *Helicobacter pylori* and ABO blood groups in patients submitted to

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upper gastrointestinal endoscopy [4].

Atrophic gastritis that occur during chronic *H. pylori* infection involve stimulation of auto reactive antibodies[5].

According to the antigens of ABO blood groups (A,B, and H antigens), the individuals will be classified either as secretors or non-secretors. Persons with blood group O lack A and B antigens and own H antigens on their cells. The enzymes responsible for managing these antigens are called transferees enzymes[6]. The absence of these enzymes in blood group O individuals[7] together with the presence of many receptors in the gastric mucosa that mediate the attachment of *H. pylori*, increase the susceptibility of *H. pylori* infection[8].

This study was aimed to determine the association between ABO blood groups and rhesus (Rh) factor with *H. pylori* infection in Iraqi patients.

### Patients and Methods

**Patients:**This is a prospective randomized controlled study in which patients who were newly diagnosed with *H. pylori* infections (male and female) enrolled during their visit to the Endoscopy Unit of Al- Yarmok Teaching Hospital from October 2020 to February 2021.

Sixty-one, selected Iraqi patients were (37 female and 24 male), with age ranges between (17-70) years, according to (ABO-Blood groups), the Patients who enrolled in this study were divided into four groups as below.

1-Group (I): included (13) patients with blood group A.

2-Group (II): included (17) patients with blood group B.

3-Group (III): included (5) patients with blood group AB.

4- Group (IV): included (26) patients with blood group O.

Data were collected from the patients through direct interview including the age, gender, history of the disease, blood group, and Rhesus (Rh) factor.

**Sample collection:**Venous blood samples were gathered from each patient, one blood drop for *H. pylori* kit(Antibody Rapid test Cassette) and another blood drop for blood group test .

**Patient assessment:**To detect the present of *H. pylori* infections, (take a blood sample from the patient then put it on *H. pylori* kit(rapid blood antibody test) when the result appeared as positive then take another blood sample to detected the type of blood group of the patient).

**Anti ABO and Anti-D:**Upon addition of the reagent,agglutination (clumping) of red cells that carry the corresponding ABO antigen or D antigen will occur directly. If there is no agglutination occur, its generally indicates the absence of the corresponding ABO antigen or D antigen[9].

**Statistical analysis:**Statistical Analysis SPSS 20was used to detect the effect of different factors on the study parameters. Where data expressed as (mean ± SD) and percentage (%).

**Results:**Table (1) demonstrated the distribution of patients infected with *H. pylori* according to ABO phenotypes were as follow; (21.31%) for blood Group A (n=13), versus (27.87%) for blood group B (n=17 ), versus (8.2%) for blood group AB (n=5), versus(42.62%) for blood group O (n=26). Highest distribution was found in Blood group O, and the less was in Blood group AB.

**Table (1): Distribution of *H. pylori* infected patients according to ABO phenotypes:**

H. pylori+ve patients	ABO phenotypes				
	A	B	AB	O	Total
	n %	n %	n %	n %	n %
	13 21.31	17 27.87	5 8.2	26 42.62	61 100

Regarding the age, The mean age (years) of *H. pylori* infected patients distribution according to ABO blood groups phenotypes as shown in table(2) were as follow:(44.25 ± 2.012) for blood group A versus (36.47 ± 3.319) for blood group B versus (41.6 ± 1.31) for

blood group AB versus (44.5 ± 5.56) for blood group O, Although the mean age of *H. pylori* infected patients in blood group O was higher than the other blood groups and less mean age was in blood group B.

**Table(2):Age distribution in *H. pylori* infected patients according to ABO phenotypes**

ABO phenotypes	<i>H. pylori</i> +ve patients
A Mean Range	44.25 ± 2.012 27→63
B Mean Range	36.47 ± 3.319 20→63
AB Mean Range	41.6 ± 1.31 17→61
O Mean Range	44.5 ± 5.56 19→70

Table (3) revealed the percentage of male patients positively infected with *H. pylori* in different ABO phenotypes, as follows:(23.1%) for blood group A versus (35.3%) for blood group B versus (20 %) for blood group AB versus (53.8%) for blood group O, the higher percentage of the infection was in blood group

O and the less was in blood group AB. Similarly, the percentage of female patients positively infected with *H. pylori* in different ABO phenotypes, as follows: (76.9%) for blood group A versus (64.7 %) for blood group B versus (80 %) for blood group AB versus (46.2%) for blood group O, the higher percentage of the infection was in blood group AB and the less was in blood group O.

**Table (3): Gender distribution in *H. pylori* infected patients according to ABO phenotypes:**

ABO phenotypes Gender	Male n %	Female n %
A total 13	3 23.1	10 76.9
B total 17	6 35.3	11 64.7
AB total 5	1 20	4 80
O total 26	14 53.8	12 46.2
Total 61	24 39.3	39 60.7

The percentage of *H. pylori* infected patients according to Rh factor demonstrated in table (4) as follows: in +Rh factor (78.69%) and -Rh factor (21.31%).

**Table (4): Distribution of *H. pylori* infected patients according to Rh factor**

Rh factor	<i>H. pylori</i> +ve patients %
Rh+	48 (78.69)
Rh-	13 (21.31)
Total	61 (100)

### Discussion

*Helicobacter pylori* infection is a worldwide problem that related with a significant morbidity and mortality [9,10]. Since the discovery of *H. pylori*, a lot of studies have been performed to detect relationship between blood group phenotypes and the incidence of *H. pylori* infection [11-15]. This study was done at smaller scale to evaluate this relationship.

The patients' blood groups distributed in the following order: 42.6 % for blood group O, 27.9 % for blood group B, 21.3% for blood group A, and 8.2 % for blood group AB which is nearly close to the results of other studies that reported a higher incidence of *H. pylori* infection within blood group O patients [16,17].

Earlier biochemical studies in ABO, Lewis and Secretor histo-blood system suggested the theory behind the correlation between ABO blood group and *H. pylori* infection and other diseases [18-20]. The proposed mechanism said that persons from O blood group are not capable of producing A or B antigens because of the absence of GTA and or GTB glycosyltransferases so instead they transform H type 1 antigen into Le<sup>b</sup> antigen (acting as receptors for *H. pylori*) in Lewis positive individuals which expressed on the surface of epithelial cells in the mucosa of the stomach and the duodenum in large quantity leading to increasing the possibility of infection by *H. pylori* [18].

In spite of the small number of patients enrolled in this research, the result showed that the distribution of mean age in all blood groups is not affected by *H.*

*pylori* infection. Comparable findings have been found by (Bayan *et al*) [21].

For blood groups A, blood groups B, and blood groups AB in the current study, the female patients showed higher percentages of *H. pylori* infection than males except for O blood groups patients where percentage of male was higher than female. This finding comes in contrast with other studies which demonstrated a significantly higher proportion of *H. pylori* positive in male compared to females in the different blood groups [22-24].

Some isolates of *H. pylori* secrete Cytotoxin-associated gene A antigen (Cag A antigen), this antigen has an important role in the most severe gastric diseases in human [25]. Although the impact of Rh factor on the incidence of infection with *H. pylori* is unknown, it was found that the risk of infection in Rh negative patients is greater, particularly with non-virulent strain (Cag A-negative) than Rh positive patients [25].

The Rh positivity in *H. pylori* infected patients was 78.7%, while other study by Jaffet *et al.* showed that Rh positivity was 92.5% [26]. A study by Bayan *et al.* was also demonstrated that Rh positivity was 92.9% in *H. pylori* infected individuals [21].

This study demonstrated that the presence of *H. pylori* infection did not correlate with Rh status in peptic ulcer patients. This finding agrees with another study of Vallianiet *al.* who found that the presence of *H. pylori* did not correlate to the Rh factor in Pakistani people [27]. Similar results were also reported by other studies [21,28].

## Conclusions

The incidence of *H. pylori* infection is high in patients with blood group O so, the blood group phenotypes may play a role in *H. pylori* infection. Meanwhile there was no correlation between age, and Rh status with distribution of *H. pylori* infection among different ABO phenotypes patients. Female patients showed higher percentages of *H. pylori* infection than males for blood groups A, B, and AB except for O blood groups patients where percentage of male was higher than female. However, larger sample size is needed to further clarify this association.

**Conflict of Interest:** Nil

**Source of Funding:** self

**Ethical Clearance:** The patients signing a written consent before doing the questionnaire

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