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Relationship between Helicobacter Pylori Infection and ABO Blood Group

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Abstract

Background and Purpose: Despite the vast number of researches on the topic, it remains controversial whether there is a significant relationship between Helicobacter pylori and ABO blood groups. The aim of this study was to verify the incidence of seropositive Helicobacter pylori infection among patients with dyspepsia symptoms and to verify the frequencies of ABO blood groups in Helicobacter pylori seropositive patients.

Methods: A prospective cross-sectional study based on purposive sampling was designed to include 50 Helicobacter pylori positive patients based on the positivity of fecal antigens in Nangarhar University Teaching Hospital from 4th July 2019 to 20th April 2020 and their blood group antigen typing was undertaken for ABO/Rh systems. Percentages and frequencies were considered for categorical variables while mean and standard deviation for continuous variables and further required statistical tests were pursued using SPSS version 26 and the significance level was set at $P < 0.05$.

Results: The ABO blood group distribution of Helicobacter pylori positive patients was 26% (13/50), 24% (12/50), 10% (5/50), 40% (20/50) for blood group A, B, AB, and O respectively. There was an association (statistically significant for some variables) between sex ($p < 0.0028$), use of NSAIDs ($p < 0.0013$), smoking cigarette ($p < 0.040$), alcohol consumption ($p = 0.062$) and coffee ($p = 0.058$).

Conclusion: The study concludes that Helicobacter pylori infection has some relation with the ABO blood group. Although Helicobacter pylori positive patients appeared more in patients with blood group O than other group types, their association was not statistically significant.

Keywords: Peptic Ulcer Diseases, ABO Blood Group, Helicobacter Pylori, Dyspepsia

Introduction

Karl Landsteiner first discovered ABO blood group in 1901. The association of ABO blood groups with some infectious and non-infectious diseases has been described in the literature (1-2).

Helicobacter pylori despite being the main etiologic agent associated with peptic ulcer disease, it causes chronic gastritis and a variety of other gastrointestinal symptoms (3-5). Many epidemiological studies have found that non-secretors of ABO blood groups and individuals with blood group O appeared the most among patients with dyspepsia (6-8).

Individuals with blood group O in the literature have been shown to have protective nature against venous thromboembolism. (8-9), pancreatic carcinoma, (10-11), and severe malaria, (12) while it was found to be prone for cholera and peptic ulcer diseases (PUD).

Epidemiological studies have shown that the prevalence of helicobacter pylori varies considerably with age, social class, and country (2-3). Helicobacter pylori is strongly associated with type B antral gastritis (4,5), peptic ulcer (6,7), gastric MALT lymphoma (8,9) and gastric adenocarcinoma. It is known that blood group antigen is associated with a risk of developing peptic ulcer and gastric carcinoma. For many years, blood group O had been associated with duodenal ulcer while gastric carcinoma was associated with blood group A but no explanation for this association was found (11-13). Peptic ulcer disease is a sore in the lining of gastric or duodenal mucosa (14) that affects around 5-10% of the general population worldwide (15). The imbalance between defensive factors such as the mucus bicarbonate barrier, prostaglandins, mucosal blood flow, cell renewal and aggressive factors such as hydrochloric acid, pepsin, and leukotrienes leads to the formation of peptic ulcer (16). There are many factors that are responsible for the imbalance between aggressive and defensive factors, of which Helicobacter pylori, non-steroidal anti-inflammatory drugs (NSAIDs), smoking and alcohol consumption are the major ones (17). There were no local data on the epidemiology of helicobacter pylori infection in the eastern region of Afghanistan; therefore, the aim of this study was to verify the incidence of seropositive helicobacter pylori infection among patients with dyspepsia symptoms and to verify the frequencies of ABO blood groups in Helicobacter pylori seropositive symptomatic patients.

Methodology

It was a descriptive prospective cross-sectional study based on purposive sampling that included 50 Helicobacter pylori positive patients, 30 males and 20 females, aging between 18-75 years in a single setting in Nangarhar university teaching hospital. Ethical approval was received and the study was registered at IRB 0003411 dated (20-8-2020). Informed written consent was obtained ahead of the study and personal data was hidden for privacy and ethical purposes. Fecal antigen test was used to identify Helicobacter pylori positive cases which were further investigated for blood groups in the laboratory of the relevant hospital. Data was stored in Microsoft excel data sheet and exported to SPSS version 26 for analysis where frequency and percentage was used for the description of categorical variables while mean \pm standard deviation for continuous variables. Chi square test was used to show difference between categorical variables while T test was used to show relation between a continuous and a categorical variable, furthermore, logistic regression was considered to show the cause and effect between continuous cause variables and a categorical output variable. P level less than 0.05 was considered significant.

Results

The mean age of the study participants was 38 ± 12 years (min 18, max 75). The ABO blood group distribution among helicobacter pylori stool antigen positive patients was 26% (13/50), 24% (12/50), 10% (5/50), 40% (20/50) for blood group A, B, AB and O respectively. There was statistically a significant association between sex ($p=0.0028$), use of NSIDs ($p=0.0013$), smoking cigarette ($p=0.040$), alcohol consumption ($p=0.0062$) and coffee ($p=0.058$).

Helicobacter pylori prevalence across gender was obtained using chi square test, Helicobacter pylori was more prevalent in males.

Table 1. Patients’ demographics and characteristics

Variables		H.Pylori Positive	Percentage	P value
Sex	Male	30	60%	0.001
	Female	20	40%	0.002
NSAIDs		7	8.43%	0.001
Alcohol		27	32.53%	0.006
Smoking		2	2.4%	
Coffee		47	56.62%	
	A	13	26%	0.175
Blood group				0.058
				0.175
	B	12	24%	0.287
	AB	5	10%	0.001
	O	20	40%	0.0028
				0.0013

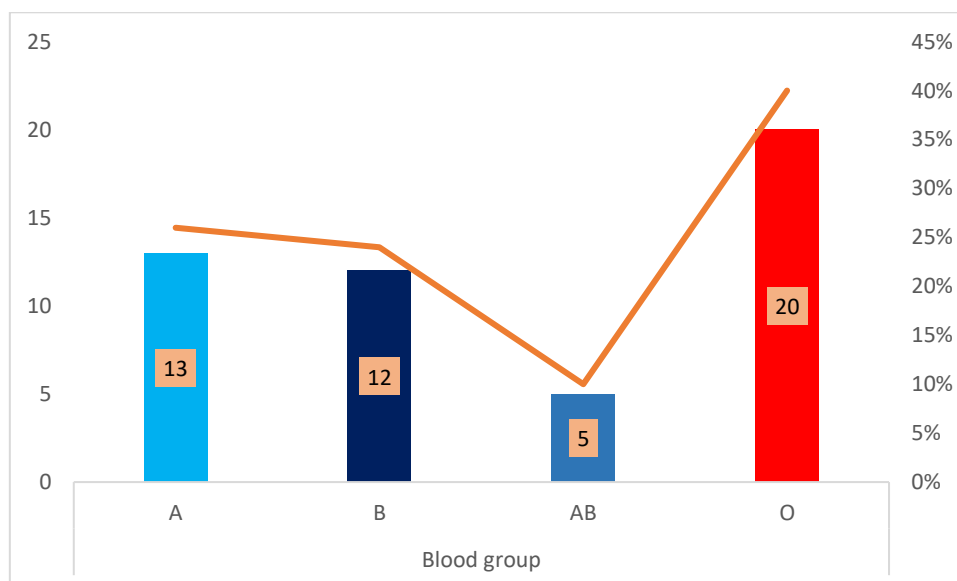


Figure 1: ABO blood group distribution across H. pylori positive subjects

The figure above shows that O group was more prominent in helicobacter pylori positive patients (40%); however, there was no statistically significant difference among blood groups ($P > 0.05$)

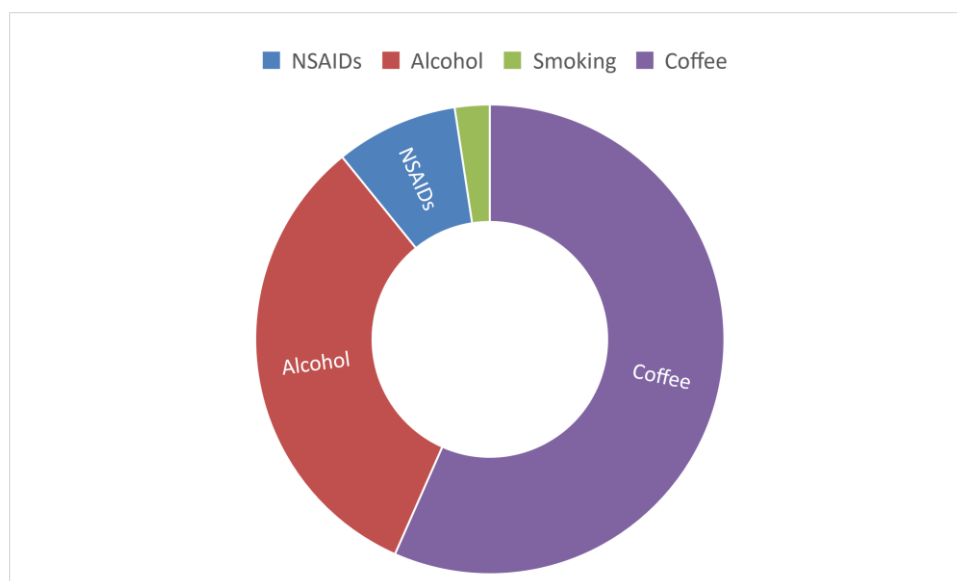


Figure 2: Concomitant risk factors for PUD

(Please mention in a text form what other risk factors (in figure 2) contributed to PUD in individual blood groups)

Therefore, compared to other blood types, blood group O had a higher incidence of helicobacter pylori infection.

Discussion

This is the first ever-published paper on the relation of Helicobacter pylori infection with specific blood groups in Nangarhar University teaching hospital. The major finding of the study denotes that people with blood group O are more prone to suffer from Helicobacter pylori infection ($P=0.01$) and its clinical manifestations and later complications related to the gastrointestinal system. Meanwhile, studies from 1950s demonstrated that blood group O is associated with duodenal ulcer disease, while gastric ulcer and gastric carcinoma are associated with blood group A. Furthermore, it is believed that people with blood group O have more receptors on their gastric mucosa for Helicobacter pylori infection (22). Previous studies also have found that people with blood group O have a higher density of colonized Helicobacter pylori; furthermore, it has been demonstrated that the Lewis antigen which is found mostly in blood group O, functions as a receptor for Helicobacter pylori adhesions and mediating bacterial adherence to gastric surface which are essential for bacterial colonization (14). The finding of the present study also supports the epidemiological view of the greater susceptibility of blood group O to infection by Helicobacter pylori (20). From here on, we recommend that people with blood group O should be screened for Helicobacter pylori infection and such people should be specifically educated for personal hygiene and the clinical manifestations of Helicobacter pylori infection mostly about when to seek the doctor's help.

Conclusion

The current study concludes that people with blood group O are more susceptible to Helicobacter pylori infection, an endemic problem with fecal oral transmission. Measures should be taken to prevent Helicobacter pylori infection by improving personal hygiene in the

susceptible people and to early diagnose and treat the cases so that we could avoid morbidity and its deleterious complications in the later life.

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