LESS

Original Article

Laparosc Endosc Surg Sci 2022;29(1):1-5
DOI: 10.14744/less.2022.27870

Are ABO blood groups associated with premalignant gastric lesions and *helicobacter pylori*?

Kadir Gisi, Murat İspiroğlu

Department of Gastroenterology, Sutcu Imam University, Kahramanmaras, Turkey

ABSTRACT

Introduction: ABO blood group, a genetically determined trait for *Helicobacter pylori*, has been considered as a potential risk factor. Blood groups have also been investigated as a risk factor for *H. pylori*-related stomach cancer. This study aimed to investigate the relationship between the ABO blood types and *H. pylori* positivity, *H. pylori*-related premalignant gastric lesions, age, and gender in people in the present region.

Materials and Methods: Patients who went through endoscopy for various complaints, from whom biopsy was taken during the process, and who knew their blood type were included in the study. The demographic characteristics of the patients, their blood groups, and their place of residence were recorded. *H. pylori* positivity and premalignant gastric lesion conditions were determined by evaluating the pathology results.

Results: A total of 160 patients, 81 (51%) of whom were female and 79 (49%) of whom were male, were included in the study. *H. pylori* positivity was found to be 59.2% in women and 37.9% in men, and the difference was statistically significant ($P < 0.05$). The blood group of 69 of the patients (43%) were A, 53 of the patients (33%) were 0, 29 of the patients (18%) were B, and nine of the patients (6%) were AB. There was no statistically significant difference between *H. pylori* positivity and ABO blood groups. The relationship between premalignant gastric lesions and blood groups was not statistically significant.

Conclusion: This study showed that there was no significant relationship between ABO blood groups and *H. pylori* positivity and premalignant gastric lesions, while age and gender were important in *H. pylori* positivity.

Keywords: ABO blood group, Atrophic gastritis, *Helicobacter pylori*, Intestinal metaplasia

Introduction

Helicobacter pylori is a Gram-negative pathogenic bacterium that lives on the human gastric mucosa. The prevalence of *H. pylori* infection in developing countries is about 80%, while in developed countries; the prevalence is 20–50%. However, it causes symptomatic disease (peptic ulcer and/or stomach malignancy) in only 10–15% of the infected patients.[1,2] *H. pylori* infection, as an environmental factor, plays an important role in the development of stomach cancer.

In 1994, *H. pylori* was classified as a Class I carcinogen by the International Agency for Research on Cancer and recognized as the main risk factor for stomach cancer.[1] Epidemiological studies showed that the number of households, living in rural areas, hygiene applications, and low socio-economic conditions are important risk factors for

Received: 12.12.2021 **Accepted:** 03.01.2022
Correspondence: Kadir Gisi, M.D., Department of Gastroenterology, Sutcu Imam University, Kahramanmaras, Turkey
e-mail: kadirgisi@gmail.com

H. pylori, and also *H. pylori* prevalence varies significantly based on age.[3,4] Intestinal metaplasia (IM) and atrophic gastritis (AG) are known premalignant lesions of the stomach and are associated with *H. pylori* positivity.

Again, the ABO blood group, a genetically determined trait for *H. pylori*, was considered a potential risk factor.[5] In a meta-analysis, it was emphasized that there is a positive relationship between O blood group and *H. pylori*. In the same meta-analysis, there was no significant relationship between *H. pylori* prevalence and other blood groups (A, B, and AB).[1] ABO blood types were also investigated as a risk factor for stomach cancer; however, these studies reported conflicting results.[6] In another case-controlled meta-analysis, it was found that the risk of stomach cancer increased a little in individuals with A blood group and those people were more likely to be infected with *H. pylori*. In addition, compared to other blood groups, individuals whose blood group is O were found to have a slightly decreased risk of stomach cancer.[7]

This study aimed to investigate the relationship between ABO blood types and *H. pylori* positivity, environment, *H. pylori*-related premalignant pathological gastric lesions, and demographic properties in people living in the present region.

Materials and Methods

The patients who underwent upper gastrointestinal system endoscopy for dyspeptic complaints between October 2020 and February 2021 in Sütçü İmam University Faculty of Medicine, Gastroenterology Endoscopy Unit were included in the study. It is a prospective observational study. The study started after receiving local ethical approval for clinical research from Sütçü İmam University Faculty of Medicine decision number 06 on October 14, 2020. During this period, 1527 patients underwent upper gastrointestinal system endoscopy with the consent of the patients. Of these patients, 479 who underwent a stomach biopsy for any reason (such as patients with treatment-resistant dyspepsia and stomach lesions) were evaluated for the study. After the endoscopic procedure, patients were questioned about their blood type, place of residence, and whether they had previously received *H. pylori* treatment, and their demographic characteristics and information were recorded. The patients were divided into four groups according to the age as 18–30, 30–50, 50–70, and over 70 years. Patients who did not know their blood type, who had previously been treated with *H. pylori*, and patients who had undergone gastric operations were excluded from the study. The demographic characteristics of the patients were recorded. The place where the patients lived was divided into rural or urban-center. The *H. pylori* positivity or negativity status of the patients, the presence of IM and AG were determined according to the results of the biopsy taken from the patients.

Statistical Analysis

SPSS 20 package program was used for data analysis. Mean±standard deviation was used for descriptive analysis. Chi-square test was used for categorical variables. Fischer's exact test was used to evaluate the relationship between gender and *H. pylori* positivity. P<0.05 was considered to be statistically significant.

Results

Of the 479 (31%) patients who underwent endoscopic biopsy, 160 (10%) patients whose blood type was known were included in the study. Of the patients enrolled in the study, 81 (51%) were female and 79 (49%) were male. The mean age of the patients was 46.5±14.83 (range 18–85 years). *H. pylori* positivity was found to be 48.8% among patients. *H. pylori* positivity was found to be 59.2% in women and 37.9% in men, and the difference was statistically significant (p<0.05) (Table 1). When the relationship between the place of residence and *H. pylori* positivity was evaluated, the ratio of *H. pylori* positivity in those who lived in rural areas was higher than those who lived in the city; however, the difference was not statistically significant (p>0.05) (Table 1). The blood group of 69 of the patients (43%) was A, 53 of the patients (33%) were O, 29 of the patients (18%) were B, and 9 of the patients (6%) were AB. There was no significant difference in *H. pylori* positivity between blood groups. The difference between the blood group of the patients detected in the pathology with IM and AG was not statistically significant (p>0.05) (Table 2). In addition, while there was no relationship between *H. pylori* positivity and AG, IM was found to be statistically significant in patients who were not infected with *H. pylori* (p<0.05). There was no statistically significant difference between patients who were Rhesus factor positive and negative and *H. pylori* positivity (p=0.609). Among the age groups, the highest *H. pylori* positivity was found in the 18–30 age group (62.5%) and the least positivity was found in patients over 70 years of age (22%) (Table 2). While there was no significant increase in AG from gastric pathological lesions with increasing age, there was a statistically significant increase in IM with age.

Table 1. Demographic characteristics of the patients and their relationship with HP

Characteristics	Number of patients n(%)	HP +(%)	HP-(%)	p
Gender				
Female	81 (51)	48 (59.2)	33 (40.8)	0,007
Male	79 (49)	30 (37.9)	49 (62.1)	
Place				
City center	119 (74)	61 (51)	58 (49)	0,279
Rural	41 (26)	17 (41)	24 (59)	
AG	23 (14.4)	10 (43.5)	13 (56.5)	0,585
IM	26 (16.3)	6 (23)	20 (77)	0,004
Age				
18-30	24 (15)	15 (62.5)	9 (37.5)	
31-50	71 (44.4)	38 (53.5)	33 (46.5)	0,097
51-70	56 (35)	23 (41)	33 (59)	
>70	9 (5.6)	2 (22)	7 (78)	

HP: Helicobacter pylori; AG: Atrophic gastritis, IM: Intestinal metaplasia.

Table 2. Relationship between blood groups and helicobacter pylori, intestinal metaplasia and gastric atrophy

Blood groups	Helicobacter pylori		p	Metaplasia		p	Atrophy		p
	Negative n (%)	Positive n (%)		No n (%)	Yes n (%)		No n (%)	Yes n (%)	
O	31 (58,5)	22 (41,5)		44 (83)	9 (17)		48 (90,6)	5 (9,4)	
A	31 (44,9)	38 (55,1)		61 (88,4)	8 (11,6)		59 (85,5)	10 (14,5)	
B	14 (48,3)	15 (51,7)	0,365	22 (75,9)	7 (24,1)	0,443	23 (79,3)	6 (20,7)	0,486
AB	6 (66,7)	3 (33,3)		7 (77,8)	2 (22,2)		7 (77,8)	2 (22,2)	
Total	82 (51,2)	78 (48,8)		134 (83,8)	26 (16,2)		137 (85,6)	23 (14,4)	
Age									
18-30	9 (37.5)	15 (62.5)		23 (96)	1 (4)		23 (96)	1 (4)	
31-50	33 (46.5)	38 (53.5)	0,097	64 (91)	7 (9)	0,01	58 (81.7)	13 (18.3)	0.391
51-70	33 (59)	23 (41)		40 (71.5)	16 (28.5)		48 (85.7)	8 (14.3)	
>70	7(77.8)	2(22.2)		7 (78)	2 (22)		8 (89)	1 (11)	

Discussion

H. pylori infection remains a major public health problem worldwide. In this observational study, the relationship between ABO blood groups, IM and AG, and *H. pylori* was investigated. Similar to some other studies,[8,9] it was observed that there was no statistically significant difference between the existence of *H. pylori* and ABO blood groups, and *H. pylori* positivity did not have an enhancing impact on IM and AG development. In the meta-analysis by Chakrani[1] et al., O blood group was associated with an estimated 16.3% increased probability of *H. pylori* infection compared to non-O blood group. In addition to, blood group B and AB were found to be associated with an estimated 17% and 29% reduction in odds of *H. pylori* infection compared with non-B, non-AB, respectively. In addition, no significant relationship was found between A type of blood and *H. pylori* infection in this study. In contrast to this study, there are studies that report that *H. pylori* positivity is higher in individuals with blood group A than in other blood groups.[7] Although the highest *H. pylori* positivity was detected in individuals with blood group A in this study, the difference was not found to be statistically significant. In the AB blood group, the lowest

H. pylori positivity in accordance with the results of this study was found.

Similar to some other studies, *H. pylori* positivity was higher in females than males in this study.[10,11] On the contrary, some studies found no significant difference between females and males in terms of *H. pylori* positivity.[12] In addition, some studies found that seropositivity was higher in males compared to females[13] These conflicting results of studies may be related to the socio-economic status and living environment of the patients who participated in the study.

IM expresses the translocation of normal gastric mucosa with intestinal mucosa which releases mucin, and AG expresses that the gastric mucosa becomes thinner, specialized gastric mucosa cells (parietal and chief cells) disappeared, and the epithelium was exposed to metaplastic transformation. AG and IM are premalignant lesions for stomach cancer.[14,15] *H. pylori* infection can lead to the appearance of gastric lesions such as IM and AG, causing chronic inflammation in general. There is also a strong increase in the prevalence of IM with age. However, it was shown that being male and having first-degree family history had a higher risk of IM development.[16,17] The studies showed that AG and IM had wide geographical variations. In general, the prevalence of AG in the world population is 33.4%, while in countries with a high incidence of gastric cancer, it increased to 42%. The prevalence of IM in the world population was 25%, while widespread IM was found to be 13%.[15,18] In this study, we found that the frequency of AG was 14.4% and the frequency of IM was 16.2%. This was lower than the worldwide population. This may be due to the small number of cases and the lack of multiple biopsies from different parts of the stomach. In this study, it was also found that the frequency of IM in negative individuals was higher than in *H. pylori*-positive individuals (21% and 8%, respectively). This situation shows that especially the patient's age is more important in the development of IM and AG, and it is not just a condition that develops due to *H. pylori* infection. However, it is noted that *H. pylori* eradication treatments can reduce the risk of stomach cancer in these patients.[15]

It is believed that the role of ABO blood antigens in gastric carcinogenesis is associated with *H. pylori* infection. However, it is not yet clear whether its role in gastric carcinogenesis is through interactions with *H. pylori* or through other mechanisms unrelated to *H. pylori*.[6] Although there are very few studies that emphasize the relationship between ABO blood groups and precancerous stomach lesions, it is noted in studies that the risk of precancerous stomach lesions is higher in *H. pylori*-positive individuals with blood group A than in those with O blood group.[19] In addition, the risk of developing stomach cancer in patients with blood group A is significantly higher than in patients with other blood groups.[20] The frequency of precancerous gastric lesions in this study, in contrast to the study conducted by Rizzato et al.,[19] was higher in people with blood groups B and AB, although it was not statistically significant. This situation can be explained by the ethnicity of the patients enrolled in the study and the geography in which they live.

This study has some limitations. The limitations of the study are that the majority of the patients enrolled in the study were from the city center, the most of the stomach biopsies were taken from the antrum, and there were no equal patients in all blood groups. However, the fact that it was one of the rare studies that highlighted the relationship between *H. pylori* infection, premalignant gastric lesions, and blood groups was a strong aspect of the study.

In summary, this study showed that there is no significant relationship between ABO blood groups and *H. pylori* positivity, while age and gender are important in *H. pylori* positivity. In addition, although this study did not reach statistical significance, it showed that AG and IM were more common in people with blood groups B and AB in the present region, and this was not correlated with *H. pylori* positivity. It is thought that significant results can be obtained with studies with a wider population.

Disclosures

Acknowledgments: Special thanks to Associate Professor Sukru Gungor for his help with the statistics of the study.

Ethichs Committee Approval: The study was approved by the Sütçü İmam University Faculty of Medicine Clinical Research local Ethics Committee, decision number 06 on 14.10.2020.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: cept – K.G., M.İ.; Design – K.G., M.İ.; Supervision – K.G., M.İ.; Materials – K.G., M.İ.; Data collection and/or processing – K.G., M.İ.; Analysis and/or interpretation – K.G., M.İ.; Literature search – K.G.; Writing – K.G.; Critical review – M.İ., K.G.

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