

Seroprevalence of Anti-*Helicobacter Pylori* and Anticytotoxin-associated Gene A Antigen Antibodies According to ABO Blood Groups and Rhesus Status Among Hemodialysis Patients

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Introduction. Correlation between *Helicobacter pylori* infection and blood group typing has been widely evaluated in both patients and healthy population. However, data addressing this correlation in hemodialysis patients are scarce. The aim of this study was to evaluate the prevalence of anti-*Helicobacter pylori* and anticytotoxin-associated gene A (anti-Cag A) antigen antibodies and their correlations with ABO blood groups and rhesus blood group status in hemodialysis patients.

Materials and Methods. In a cross-sectional study, serum samples of 151 hemodialysis patients were tested for anti-*Helicobacter pylori* IgG antibody. Anti-Cag A antibody (IgG antibody) was tested in *Helicobacter pylori*-positive patients. ABO blood groups typing and rhesus status were tested by hemagglutination test.

Results. Prevalence of anti-*Helicobacter pylori* and anti-Cag A antibodies in *Helicobacter pylori*-positive patients were 65.6% (99 of 151) and 25.3% (25 of 99), respectively. Prevalence of anti-*Helicobacter pylori* and anti-Cag A antibodies were 69.1% and 36.8% in patients with blood group A, 42.3% and 9.1% in blood group B, 75.0% and zero in blood group AB, 69.4% and 23.3% in blood group O, 59.0% and 30.6% in rhesus-positive status and 89.7% and 11.5% in rhesus-negative status, respectively. There was a significant correlation between the presence of anti-*Helicobacter pylori* and anti-Cag A antibodies and rhesus status, but no significant relation between ABO blood groups and anti-Cag A antibodies were found.

Conclusions. Rhesus status may have an impact on the presence of anti-*Helicobacter pylori* and anti-Cag A antibodies. More investigations to address this correlation are necessary.

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INTRODUCTION

Helicobacter pylori infection is one of the widespread chronic bacterial infections in the world. It may cause gastric diseases such as peptic ulcers and gastric cancer.¹⁻³ Bacterial virulence factors like cytotoxin-associated gene A antigen (Cag A) seem to influence the inflammatory response to

H pylori. Cytotoxin-associated gene A antigen is thought to be the major *H pylori* virulence factor. This antigen is produced by a subset of *H pylori* isolates, which has been associated with the most severe gastric diseases in human.^{4,5}

Risk factors associated with *H pylori* infection have been more investigated. Some studies were

focused on the role of blood group antigens that is the most widely investigated erythrocyte antigen system in all populations.⁶ On the other hand, in recent years, number of studies has revealed that *H pylori* infection is accompanied by the several diseases such as iron deficiency anemia, migraine, coronary heart disease, and chronic renal failure.⁷⁻¹⁰ Patients with chronic renal failure often have *H pylori* infection, which may cause dyspepsia and leads to peptic ulcer diseases.^{11,12} The relationship between ABO blood groups, rhesus (Rh) status and *H pylori* infection in hemodialysis patients has not been studied yet. In this study, we aimed to determine the prevalence of *H pylori* infection and Cag A status in hemodialysis patients along with assessment for correlation between ABO blood groups, Rh status, and *H pylori* infection in this population.

MATERIALS AND METHODS

We enrolled 151 hemodialysis patients from a hemodialysis center affiliated with Urmia University of medical sciences, Urmia, Iran; in a cross sectional study. After obtaining an informed consent from participants, all demographic data including medical history, and smoking habit were recorded in provided questionnaires. The study's protocol was approved by the ethics committee at the Urmia University of medical sciences.

Peripheral blood samples were collected from each patient after hemodialysis. They were centrifuged and serums were separated, frozen and kept at -80°C. Serum anti *H pylori* IgG antibody was detected by enzyme-linked immunosorbent assay kit (Globe Co, Milan, Italy). Serum anti-Cag A IgG antibody was assessed in anti-*H pylori*-positive patients by an enzyme-linked immunosorbent assay kit (DiaPro Co, Milan, Italy). ABO blood group typing and Rh status was detected by hemagglutinin test.

Statistical analysis was performed using the SPSS software (Statistical Package for the Social Sciences, version 16.0, SPSS Inc, Chicago, Ill, USA).

The chi-square test and the *t test* were used to determine the distribution pattern and correlation between variables. A *P* value less than .05 was considered significant.

RESULTS

Demographic characteristics of the studied population are shown in Table 1. A total of 151 hemodialysis patients, 73 women (48.3%) and 79 men (51.7%), were enrolled in this study. The mean age of studied population was 54.2 ± 14.6 years. Twenty-one patients (13.9%) were smokers. The mean age of the participant men was 53.6 ± 1.8 years, and it was 54.9 ± 1.6 years for the women. The mean duration time of dialysis was 46.5 ± 42.9 months (range, 2.4 to 216 months).

A total of 4.6% of the patients (n = 7) had a kidney disease (chronic pyelonephritis, glomerulonephritis, and polycystic kidney diseases), 3.3% (n = 5) had urologic disorders, 55.0% (n = 83) had hypertension, and 21.2% (n = 32) had diabetes mellitus. Sixty-two patients (41.1%) had dyspepsia and 9 patients (6.0%) had a positive history of gastrointestinal bleeding.

The prevalence of anti-*H pylori* and anti-Cag A antibodies according to age and gender of the studied population is summarized in Table 2. The prevalence of anti-*H pylori* antibody in hemodialysis patients was

Table 1. Baseline Characteristics of Hemodialysis Patients

| Characteristics | Values |
|---------------------------------|-------------|
| Total number | 151 |
| Mean age, y | 54.2 ± 14.6 |
| Male gender, % | 51.7 |
| Duration of dialysis, mo | 46.5 ± 42.9 |
| Dyspepsia, % | 41.1 |
| Gastrointestinal bleeding, % | 6.0 |
| History of diabetes mellitus, % | 21.2 |
| History of hypertension, % | 55.0 |
| History of renal disease, % | 4.6 |
| Urologic problems, % | 3.3 |
| Smoking, % | 13.9 |

Table 2. Prevalence of Anti- *Helicobacter Pylori* and Anti-Cag A Antibodies According to Age and Gender*

| Characteristic | <i>H Pylori</i> | | | Anti-Cag A | | | ABO Blood Group | | | | | Rh |
|--------------------|-----------------|----------|----------|------------|----------|----------|-----------------|---------|---------|---------|----------|----------|
| | Positive | Negative | <i>P</i> | Positive | Negative | <i>P</i> | A | B | O | AB | <i>P</i> | Positive |
| Number of patients | 99 | 52 | ... | 25 | 74 | ... | 55 | 26 | 8 | 62 | ... | 122 |
| Sex | | | | | | | | | | | | |
| Male | 53 | 22 | | 12 | 41 | | 30 | 8 | 6 | 34 | | 58 |
| Female | 46 | 31 | .60 | 13 | 33 | .05 | 25 | 18 | 2 | 28 | .33 | 64 |
| Mean age, y | 58 ± 14 | 55 ± 16 | .66 | 53 ± 16 | 54 ± 14 | .82 | 55 ± 15 | 52 ± 13 | 59 ± 15 | 53 ± 14 | .08 | 54 ± 15 |

*Cag A indicates cytotoxin-associated gene A; *H pylori*, *Helicobacter pylori*; and Rh, rhesus blood-group system.

65.6% (99 of 151 patients). The prevalence of anti-Cag A antibody in patients who were positive for anti-*H pylori* antibody was 25.3% (25 of 99 patients; Table 2).

There was no significant difference regarding the existence of anti-*H pylori* antibody between the men and the women ($P = .61$). However, a nearly significant difference was found between the men and the women in anti-Cag A antibody in *H pylori*-positive patients ($P = .05$). As it is shown in Table 2, the mean age of anti-*H pylori*-positive patients was 58.0 ± 14.0 years, and it was 54.8 ± 15.7 years in anti-*H pylori*-negative ones ($P = .66$). There was no significant relation between age and the prevalence of anti-Cag A antibody ($P = .82$).

The frequency of ABO blood groups and Rh status according to gender and age of studied population are shown in Table 2. Distribution of the age of patients among different blood groups was similar ($P = .08$). In this study, the phenotypic distribution of ABO blood groups was as follows: 55 (36.2%), blood group A; 26 (17.1%), blood group B; 62 (40.8%), blood group O; and 8 (5.3%), blood group AB. The Rh factor was positive in 122 patients (80.7%). The frequency of ABO blood groups in 122 Rh-positive patients was as follows: 48 (39.4%), 21 (17.2%), 49 (40.1%), and 4 (3.3%) had blood groups of A, B, O, and AB, respectively.

Table 3 shows the prevalence of anti-*H pylori* and anti-Cag A antibodies according to ABO/Rh status in hemodialysis patients. There was no significant association between the prevalence of anti-*H pylori* antibody, anti-Cag A antibody, and ABO blood group typing in hemodialysis patients. However, the correlations between the prevalence of anti-*H pylori* antibody, anti-Cag A antibody, and Rh status were significant.

DISCUSSION

Association between *H pylori* infection, ABO

blood groups and Rh status in disease states has been widely evaluated in the past. Our study, showed a significant correlation between anti-*H pylori* antibody, anti-Cag A antibody and Rh status in hemodialysis patients. However, we did not find any significant association between anti-*H pylori* antibody, anti-Cag A antibody and ABO blood groups in our studied population. Our findings showed that, Rh status has an influence on the prevalence of the *H pylori* infection with the virulent Cag A-positive strain. In other words, Rh negative patients have a greater risk of *H Pylori* infection, especially with its nonvirulent strain (Cag A-negative) than Rh positive patients.

Unfortunately, we did not find any data about the correlation between ABO/Rh blood groups and *H pylori* infection in hemodialysis patients. However, several researchers demonstrated that *H pylori* infection would be related to ABO blood groups in normal population.⁴ Although the results of studies were different in some aspects, most of them focused on the role of blood groups in *H pylori* infection with emphasis on the positive role of blood group O and A.^{4,13,14} Kanbay and colleagues reported that patients with A and O blood groups were more prone to *H pylori* infection and patients with AB blood group had less susceptibility to *H pylori* infection.¹ No association was reported in the other studies like Sasidharan and coworkers and Yucel and colleagues.^{15,16}

Increased susceptibility of individuals with blood group O to *H pylori* infection might be due to higher colonization of this gram negative bacterium in the gastric mucosa. Since in hemodialysis patients the gastric mucosa changes in some aspects such as histologically proven gastritis and higher gastrin levels,¹⁷⁻¹⁹ it comes to mind that the pattern of association between ABO blood groups, Rh status, and *H pylori* infection in hemodialysis patients

Table 3. Prevalence of Anti- *Helicobacter Pylori* and Anti-Cag A Antibodies According to ABO/Rh Status in Hemodialysis Patients

| Patients | ABO Blood Group | | | | P | Rh Blood Group | | |
|-----------------|-----------------|-----------|---------|-----------|-----|----------------|-----------|------|
| | A | B | O | AB | | Positive | Negative | P |
| <i>H pylori</i> | | | | | | | | |
| Positive | 38 (69.1) | 11 (42.3) | 6 (75) | 43 (69.4) | .08 | 72 (59) | 26 (89.7) | .01 |
| Negative | 17 (30.9) | 15 (57.7) | 2 (25) | 19 (30.6) | | 50 (41.3) | 3 (10.3) | |
| Anti-Cag A | | | | | | | | |
| Positive | 14 (36.8) | 1 (9.1) | 0 | 10 (23.3) | .10 | 22 (30.6) | 3 (11.5) | .005 |
| Negative | 24 (63.2) | 10 (90.9) | 6 (100) | 33 (76.7) | | 50 (69.4) | 23 (88.5) | |

*Values in parentheses are percentages. Cag A indicates cytotoxin-associated gene A; *H pylori*, *Helicobacter pylori*; and Rh, rhesus blood-group system.

differs from normal population.

According to our findings anti-*H pylori* antibody had a greater prevalence in order in hemodialysis patients with blood groups O and A, but the correlation was not significant. Higher prevalence of anti-Cag A-negative in hemodialysis patients was the other finding of this study.

These findings are in accordance with Asl and coworkers as they showed higher colonization of *H pylori* in non ulcer dyspeptic hemodialysis patients compared with the control group.¹⁶ About 41% of hemodialysis patients in our study had dyspepsia. Mortazavi and colleagues found the high prevalence of *H pylori* infection in children on hemodialysis in whom the mean duration of dialysis was 12 ± 11 months.²⁰

In contrast to our results, Sugimoto and associates showed low prevalence of *H pylori* infection in hemodialysis patients in over a four-year observation.²¹

CONCLUSIONS

We showed that, in hemodialysis patients ABO blood groups and Rh status may have an impact on the prevalence of *H pylori* infection. However, more studies with large sample sizes are required to clarify this correlation in hemodialysis patients.

CONFLICT OF INTEREST

None declared.

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