RESEARCH ARTICLE

Factors Associated with *Helicobacter Pylori* Infection, Results from a Developing Country-Pakistan

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Abstract

Background: It is known that blood group antigens are related to the development of peptic ulcer and gastric carcinoma. Infections due to *H. pylori* are most widespread among the developing regions due to poor standard of public health. This study sought to determine the association of *H. pylori* with ABO blood groups, age, gender, and smoking status among inpatients at a public sector hospital in Karachi. Materials and Methods: A cross-sectional study was conducted at endoscopy suite at a public sector hospital in Karachi in the year 2011. All the symptomatic patients coming for upper GIT endoscopy were included in this study. Results: Biopsy for histopathology was taken from 93 patients, with an age range from 15-65 years. Age group of 15 to 20 years was found to be associated with *H. pylori* infection but without significance (p-value 0.83). In all, 36 (38.7%) turned out to be *H. pylori* positive with a significant male preponderance (p=0.04). Distribution of ABO blood groups in *H. pylori* positive group were A=31.4%, B=15.4%, AB=25.0% and O=53.7%, with a statistically significant link for blood group O (p=0.05) . Rhesus factor was also compared but significant relationship was evident (p-value 0.73). Conclusions: This study demonstrated that *H. pylori* infection can be related to ABO blood group, middle age persons and male gender. People of blood group O are more prone to develop infection related gastritis, ulcers, and even perforations, so they should be more cautious against transmission of the bacterium.

Keywords: *Helicobacter pylori* - ABO blood-group system - factors - gender - age - Pakistan

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Introduction

Helicobacter pylori infection is the most common chronic bacterial infection around the world (Kanbay et al., 2005). It has been shown that 50% adult in developed countries and 90% adults in developing countries were positive of serum antibodies against *H. pylori* (Wu et al., 2003). The critical period at which *H. pylori* is acquired, is during the childhood, especially in the developing countries and areas of overcrowding and socioeconomic deprivation (Moayyedi et al., 2002).

This bacterium is Gram-negative organism. The pathogen has a strong association with a variety of gastric pathologies, including type B antral gastritis, peptic ulcer, gastric MALT lymphoma, and gastric adenocarcinoma (Jing et al., 2012). It is consider that *H. pylori* infection is the most common cause of morbidity and mortality in upper digestive tract diseases. Currently, it had shown the effects of *H. pylori* infection on the development of extra-alimentary ailments such as coronary disease, myocardial infarction, Raynaud's syndrome, migraine, dermatological disorders, iron deficiency anemia and some autoimmune diseases (Celinski et al., 2006).

However, in majority of patients the infection is asymptomatic and only minority of *H pylori*-infected patients develop gastric diseases. This shows that, some additional factors such as the genetic predisposition of the host and the genotype of *H pylori* strains have influences on it. Studies have discovered a blood group antigen binding adhesin (BabA), which help the organism to adhere to the epithelial cells (Martins et al., 2006). Boren et al. demonstrated that, the H and Leb antigens of the ABH and Lewis (Le) blood group systems are the receptors on gastric epithelial cells for *H pylori* (Kanbay et al., 2005). It has been shown that gastric mucosa of blood group O are more prone for the attachment of *H pylori*, because they had more receptors, and Lewisb antigens mediated the attachment of *H. pylori* to the mucosa (Kanbay et al., 2005). Furthermore, these individuals are at high risk of developing gastric and duodenal ulcers because higher density of colonization of the pathogen was reported with the people having blood group O (Kanbay et al., 2005). It has also been shown for many years, that blood group A had been associated with gastric carcinoma, while

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duodenal ulcer was associated with group O; however no explanation for this association was received (Kanbay et al., 2005).

The relation between *H pylori* infection and lifestyle is uncertain, but its intensification in the individual populations is strongly related to economic conditions. Developing countries are at highest risk, due to people living in poor socioeconomic conditions. The increasing risk factor includes; poor sanitary conditions, overpopulation, consumption of raw foods, like food items purchased from street stalls and unsafe water supply sources (Zhong et al., 2012). Smoking and smokeless tobacco use are associated with increasing risk of *H. pylori*, which is very common in south Asian countries, mainly Pakistan (Wu et al., 2003; Valliani et al., 2012). Some studies reported that alcohol is protected against infection while coffee had the opposite effect, but these results are variable (Wu et al., 2003). Epidemiological studies demonstrate the incidence of *H. pylori* infection appears to be higher in children than in adults, possibly due to lower standards of personal hygiene in younger populations (Moayyedi et al., 2002).

Therefore the aim of this study was to explore the association of *H. pylori* with ABO blood groups, age, gender, and smoking status among inpatients at a public sector hospital in Karachi.

Materials and Methods

A cross-sectional study was conducted at endoscopy suite of a medical unit at a public sector hospital of Karachi in the year 2009. There are five medical units in the hospital and two units conduct endoscopy two times per week. At an average rate, there are around 20 endoscopies done in a day. All the symptomatic patients coming for upper gastrointestinal tract (GIT) endoscopy were included in study. Later results of only those patients were analyzed whose biopsy was taken for histopathology to confirm *H. Pylori* infection. The symptomatic patients whose endoscopy were not done for any reasons and the patients came with the complaint of upper GI bleeding and band ligation were excluded from the study. Patients diagnosed with Gastro-esophageal reflux disease on endoscopy, were also excluded from the study.

Blood groups were checked using highly sensitive and specific anti sera on slide method. Pinprick method is used to collect few drops of participant blood over three glass slides. Sample 1 on the first slide is mixed with Antisera A, second with Antisera B and third with Antisera D and check the agglutination on the slide. In case of blood type A, clumping will appear in the field of anti-A, for blood type B, clumping will appear in the field of anti-B, for blood type AB, clumping will appear in fields of both anti-A and anti-B and if the blood is type O, no clumping will appear. Same, if Rh is positive, clumping occurs in the field of Anti-D. Permission was sought from the Head of the Department of Medical Ward and participants.

A structured questionnaire was formulated after thorough literature search and input from the experts. The questionnaire was composed of two sections. Section A, included questions on demographic detail of the participants (age, gender). Section B dealt with the factors related with *H. Pylori* (blood group, tobacco use etc.) A Pretest was done on 20 respondents and no changes were deemed necessary in the questionnaire after pretesting. The results of the pretest are not included in the final analysis. Family history of infection was defined as if siblings, parents and grandparents ever got *H. Pylori* infection. Preferred eating habits were categorized as homemade or outdoor foods.

Questionnaires were filled by the medical graduates specifically trained for the task. A total of 148 patients underwent upper gastrointestinal endoscopy. Before endoscopy their blood groups was checked by the research medical officers and were later confirmed by the doctors. Biopsy was taken from 93 patients out of them 37 were males and 56 were females with age range of 18-65 years. We divided our study population into two groups; Group I: *H. Pylori* positive patients (n=36) and Group II: *H. pylori* negative (n=57).

The Family Medicine Research Committee (FMRC) at the Aga Khan University reviewed and approved the study. The study fulfilled all the ethical considerations of the declaration of Helsinki. Written informed consent was obtained from all the study participants after explaining them about the research protocol. Confidentiality of the participants was ensured at all stages of the research.

Statistics

Statistical analysis was carried out using SPSS software (Statistical Package for the Social Sciences, version 17). Proportions were reported for all the variables such as age, gender, tobacco use, blood group etc. Pearson chi-square test was used to find out the association of *H. Pylori* infections with studied factors. A p value of <0.05 was considered statistically significant.

Results

In all, 148 patients underwent upper GI endoscopy during the study period. Out of these patients, biopsy for histopathology was taken from 93 patients and the rest were labeled as non-ulcer disease. Of them, 60.2% were females with age range 15-65 years. On histopathology, 36 (38.7%) were turned out *H. Pylori* positive with a significant male preponderance (p-value=0.04).

Proportion of *H. Pylori* infection was higher among patients with age group of 15-20 years (46.2%), but compared to their elder counterparts it was not found significant (p-value=0.83). Distribution of ABO blood groups in *H. Pylori* positive were A=31.4%, B=15.4% AB=25.0% and O=53.7% (p=0.05). There is almost equal distribution of *H. Pylori* infection (p-value=0.73) among Rh positive and Rh negative cases (Rh positive=33/84 (39.3%) and Rh negative = 3/9 (33.3%). There was no significant association of *H. Pylori* infection among the smokers and the non-smokers (p=0.15). Similarly, no significant association was found among those who had known family history (siblings, parents and grandparents) of infection (p-value=0.41), habit of eating outside (p-value=0.82) and their duration of symptoms (p-values=0.59).

Table 1. Characteristics of the Study Participants (n=93)

Characteristics		N	%
Age	15-20 years	13	14
	21-40 years	49	52.7
	>40 years	31	33.3
Gender	Male	37	39.8
	Female	56	60.2
Blood group	A	35	37.6
	B	13	14
	O	41	44.1
	AB	4	4.3
Rh factor	Positive	84	90.3
	Negative	9	9.7
Tobacco Use	Yes	33	35.5
	No	60	64.5
Preferred Eating habits	Homemade	81	87.1
	Outdoor	12	12.9
Symptoms duration	<1 yrs	33	35.5
	1-3 yrs	33	35.5
	>3 yrs	27	29
Known Family history	Yes	24	25.8
	No	69	74.2

Table 2. Factors Associated with *H pylori* among the Study Participants

Variables		*H pylori* Positive		*H pylori* Negative		P value
		(n)	(%)	(n)	(%)	
Age:	15-20	6	46.2	7	53.8	0.83
(years)	21-40	18	36.7	31	63.3	
	>40	12	38.7	19	61.3	
Gender:	Male	19	51.4	18	48.6	0.04*
	Female	17	30.4	39	69.6	
Blood group						
	A	11	31.4	24	68.6	0.05*
	B	2	15.4	11	84.6	
	O	22	53.7	19	46.3	
	AB	1	25	3	75	
Rh factor:	Positive	33	39.3	51	60.7	0.73
	Negative	3	33.3	6	66.7	
Tobacco Use						
	Yes	16	48.5	17	51.5	0.15
	No	20	33.3	40	66.7	
Preferred Eating habits						
	Homemade	31	38.3	50	61.7	0.82
	Outdoor	5	41.7	7	58.3	
Symptoms duration						
(years)	<1	11	33.3	22	66.7	0.59
	1-3	15	45.5	18	54.5	
	>3	9	37	18	63	
Known Family history						
	Yes	11	45.8	13	54.2	0.41
	No	25	36.2	44	63.8	

*Significant variables p value < 0.05

Discussion

This study shows that there is a strong association of blood group O with *H. Pylori* related diseases. It also explains that people of younger age group between 21-40 years and male gender are more prone to acquire the infection. The recognition of *H. pylori* infection as the main cause of ulcer was undoubtedly the most important achievement in the past 50 years in gastroenterology (Mbulaiteye et al., 2009). Moreover, the conclusion that ulcer was a curable disease with a short treatment schedule was a blessing to millions of people (Dojo et al., 2003).

The association of *H. Pylori* with blood group antigens fascinated doctors for few decades when an association was discovered between the infection of *H. Pylori* and blood group O. However, little work was done on the issue until 1993, when Boren et al demonstrated that an antigen Leb, of the Lewis blood group system, acted as a receptor for *H. Pylori* to bind (Alkout et al., 2000). This antigen is most frequently found on blood group O as compared to other groups. This evidence was further supported by another study which demonstrated that the H-antigen, expressed on the gastroduodenal cells, acted as a receptor for *H. Pylori* (Alkout et al., 2000). A separate study by other group of researchers reported that the H antigen expression in the duodenal mucosa is controlled by FUT1 (H) using type II oligosaccharide precursor. This fucosylated antigen is not modified to A or B antigens in blood group O, which points to the fact that there is a positive correlation between this blood group and the infections caused by *H. Pylori*. However, it is also shown that blood group A is found to be related with *H. Pylori* infection (Bhuiyan et al., 2009), as Kanbay et al demonstrated that *H. Pylori* infection is related with both O and A blood group type and reported negative relation with AB group (Kanbay et al., 2005). Results of our study are however consistent with the association of *H. Pylori* infection with blood group O relation (Martins et al., 2006).

There have been conflicting results in several studies over the relation of ABO blood group and *H. Pylori* (Yei et al., 2005; Sasidharan and Uyub, 2009). A study by Wu et al did not show a relation between the ABO blood group and *H. Pylori* infection (Wu et al., 2003). Nonetheless, a study in Iran, reported a partial influence on the prevalence of *H. Pylori* infection with ABO blood groups (Jafarzadeh et al., 2007). Our study result also demonstrates the association of Rh positive antigen blood group O with *H. Pylori* infection.

In our study we failed to show any association between smoking and infection by *H. Pylori*, which is consistent with the findings of (Kanbay et al., 2005). Although, another study conducted by Moges et al demonstrated that *H. Pylori* infection is related to alcohol abuse (Moges et al., 2006) but due to cultural and religious reasons we did not asked about the use of alcohol by study participants. Literature reveals that *H. Pylori* infection is more prevalent in children and younger ages (Moayyedi et al., 2002). In our study also *H. Pylori* infection is more prevalent among patients with young age. This survey also suggests that males are predominant for having *H. Pylori* infection than females as also shown by (Jafarzadeh et al., 2007).

The limitations of this study are worth to be noted. The study population was confined to only endoscopic suit of medical unit of a public sector hospital, which limits the actual prevalence of *H. Pylori* infections and studied factors. As the study was not based on microbiological level of evidence, so we cannot comment on the causal association between *H. Pylori* and blood group O.

In conclusion, the findings of this showed that ABO

blood group, middle age persons and male gender are related to *H. Pylori* infection. Moreover, people of blood group O are more prone to develop infection related gastritis, ulcers, and even perforations, so they should be more cautious against transmission of it. On the basis of the study results we further recommend that people with identified factors should be more cautious against transmission of *H. Pylori* infection. Additional studies are warranted to explore this issue in more detail.

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