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Incidence Of Helicobacter Pylori Infection in Association With ABO Blood Groups

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Abstract

Objective: The study aimed to investigate the association between ABO blood groups and helicobacter infection.
Method: 150 participants, including 93 females and 57 males between the age group of 18-60 years, were involved in the study. A sample of 3 ml blood was collected and screened against H. pylori antibodies (IgG) by H. pylori rapid diagnostic kit. ABO and Lewis antigen phenotypes were determined with a macroscopic agglutination technique.
Results: According to the study's findings, there were 55.42% women (46/83) and 44.5% men (37/83) among the 83 seropositive patients, while 70.14% women (47/67) and 29.85% men (20/67) were found among the 67 seronegative patients. The findings of this study reveal that those with the blood groups O+ and B+ have an estimated 25.3% (21/83) higher risk of H. pylori infection, whereas when seronegative individuals were investigated, it was discovered that blood groups 0+ were also leading, 28.4% (19/67), indicating that there was no significant difference between H. pylori seropositive and seronegative patients (p-value = 0.5146). Other factors, such as gender and family history, did not significantly affect the incidence of H. pylori.
Conclusion: It was concluded from the study that no significant difference was observed between trends of H. pylori seropositive patients and seronegative individuals having different blood groups.
Keywords: ABO Blood Group, Peptic Ulcer, Seronegative Pyloric patients, Seropositive Pyloric patients.

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1. Introduction

Globally, over half of all people are infected with Helicobacter pylori. The infection may start in childhood and last the rest of a person's life. Most people with infection remain asymptomatic, but others suffer from acute gastritis, duodenal or peptic ulcers, stomach cancer, and mucosa-associated tissue lymphoma.[1]The gram-negative, helical, microaerophilic bacteria Helicobacter pylori, or H. pylori, is known to colonize the stomach mucosa in humans.[2] Biochemically, it is urease, catalase, and oxidase positive, isolated for the first time in 1982 by Warren and Marshall.[3] Additionally, the production of urease in a large amount helps to break down urea, resulting in the production of CO2 and ammonia, which helps to neutralize the acidic pH of the stomach. H. pylori colonization results in chronic gastritis. The acid in the stomach and the digestive enzyme 'pepsin' combine and result in a synergistic effect leading to ulcer formation.[4] It is mostly prevalent in areas with lower socio-economic status and poor hygienic conditions.[5]H. pylori has a very high ability to live in a very harsh gastric environment accompanied by acidity, peristalses, and attacks by phagocytes.[6] Diagnoses for H. pylori infections can be made using several techniques, including: (i) invasive techniques (such as endoscopy and culture) followed by histopathology, different molecular, and/or nucleic acid amplification tests; and (ii) non-invasive techniques (such as urea breath tests, faecal antigen tests, and serological tests) that do not require endoscopy.8. Serological tests are among the non-invasive techniques that are easy, quick, affordable, and practical.[7] Colonization of H. pylori depends upon the location and quantity of acid production in the stomach. Colonization occurs at the pyloric end of the stomach in case of high acid production to avoid acid-secreting parietal cells at the fundus.[8] If the acid production is lower, H. pylori colonizes the whole stomach, followed by the inflammatory response in atrophy of the stomach lining and, eventually, ulcers in the stomach, which may increase the risk of leading to stomach cancer.[9]

Blood type antigens on red blood cells are permanently mounted and lifelong biological markers for any person, just as individual as fingerprints. The distribution of the ABO blood groups fluctuates in the population worldwide. In addition to the clinical significance of blood groups for transfusion and transplantation, it is now becoming more likely that ABO antigens have biological importance as well, and

they may be linked with susceptibility to or protection against many diseases.[10] Non-secretors may be resistant to H. pylori, and the bacteria may adhere to the Lewis B antigen, which is expressed on the stomach mucosa's surface and correlates with the risk of infectious diseases. A type 1 H antigen, which is frequently present in the stomach lining, is bound by a protein called Baba, which is produced by H. pylori. BabA can also attach to Leb, which is present in large concentrations in stomach cells associated with the O and secretor phenotype. This explains the increased risk of gastrointestinal disorders like gastritis and stomach ulcers in those with type O blood.[11]

The relationship between H. pylori and ABO blood groups with those of some contagious and non-contagious disease has been reported. In many epidemiological studies, it had been found that non-secretors of ABO blood groups antigens and those patients having blood group O have represented a larger number of patients suffering from peptic ulcers.[12] The main objective of current research was to check the trend of H. pylori infection in ABO blood groups among participants of different ages, socio-economic status and in genders and to investigate the association between ABO blood groups and their mode of secretion with peptic ulcers.

2. Materials & Methods

The methodology involves blood samples of patients who attended OPD of district Headquarters, Haripur, with symptoms of having H. pylori infection. The research proposal was reviewed and approved by the University and Departmental ethical committees. It was ensured that all the patients' information and samples would only be used for research purposes and would not be misused. Participation was voluntary, and informed consent was obtained from each study participant. The current research was a cross-sectional study of patients as it collects data from a specific population at a single point in time. Those who attended OPD of District Headquarters, Haripur, with symptoms of dyspepsia, gastric ulcers, acidity, etc. either for the first time or repeated symptoms of H. pylori infection and treatment are considered as inclusion criteria of the study and those with no history of above-mentioned symptoms and patients with pre-existing medical conditions that may confound the study results or those patients unwilling to participate in the study are excluded from the research.

A questionnaire, which was in English language, was designed based on clinical signs and symptoms that usually appear during H. pylori infection, the diet, and the fluid intake of the participants were used in one of the recent studies.[12] It was also questioned whether any previous treatment had been taken by the patient or not, and if "Yes", what kind of treatment the participant had taken? The outcome of the type of treatment, combined treatment, and dose completions are mentioned in Table 2.

All the samples were screened for H. pylori infection by Diaspot H. pylori Antibody, a rapid test kit. The sensitivity and specificity of the serum H. pylori antibody test were 88.4% and 93.4%, respectively. The faecal antigen test and tissue quick urease test had specificities of 89.9% and 98.9%, respectively, and sensitivities of 89.3% and 55.6% .[13] The serology test has been used in many previous studies in which one of the recent studies.[14] In addition, serology tests are more patient-acceptable than invasive techniques like endoscopy because they only require a straightforward blood collection and are non-invasive. Furthermore, serology tests are more affordable than certain other diagnostic techniques like endoscopy, etc. For each patient, a sample of 3 ml peripheral blood was collected in K3 EDTA anticoagulant tubes. The blood was centrifuged at 3000 rpm, and serum was taken for H. pylori test. The serum was screened against H. pylori antibodies (IgG) by H. pylori rapid diagnostic test.[14] A drop of serum was taken and placed on the sample well of the kit, and then 2 drops of buffer were added to dilute the sample. After waiting for 2-4 minutes, a pink coloured line appeared on the Test (T) line which indicated the presence of H. pylori IgG antibodies in the specimen, showing a positive result. No appearance of the T line was an indication that IgG antibodies specific to H. pylori were not present in the specimen, showing negative results as shown in Figure 1.

ABO and Lewis antigen phenotypes were determined with a macroscopic agglutination technique using common commercially available anti-A, anti-B, and anti-D blood grouping reagents (Medirex Diagnostic GmbH. Pfotenhauerstr 108101306 Dresden Germany).3 drops of blood were taken from each sample and a drop of each anti-serum (anti-A, anti-B, and anti-D) was added to each drop of blood marked A, B, and O, respectively. The blood group was identified by the standard hemagglutination test after slightly shaking the

slide in a round movement to mix the blood with the anti-serum shown in Figure 2.

The prevalence of H. pylori infection was checked, then blood group antigen production in all the samples, Gender, age of the patient's treatment type, dosage completion, combined treatment, and if any other family member is also suffering from H. pylori. All these parameters were analyzed individually, and then the prevalence of H. pylori and its trends in Lewis ABO blood groups were tested using Blood group * H. pylori Cross tabulation. Two-tailed p-value was calculated using a t-test in SPSS version 19 to analyze the results.

3. Results

In the current study, 150 total samples between the age group of 18-60 years were involved in the study and were tested for H. pylori infection, among them 55.3% (83/150) were seropositive as shown in Figure 3.

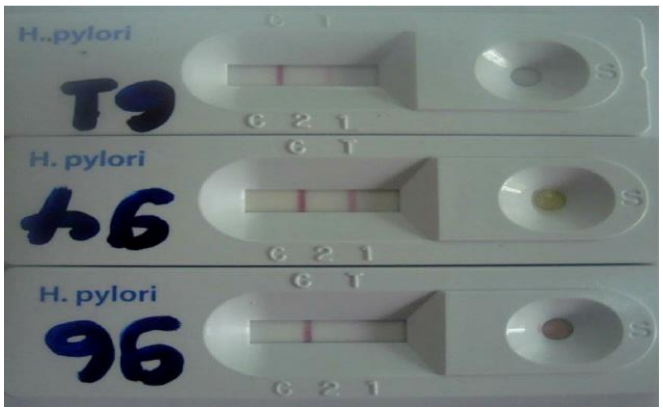

Figure 1: Screening of *H. pylori* IgG antibodies using rapid test kits.

Figure 2: Blood groups tested using the hemagglutination method.

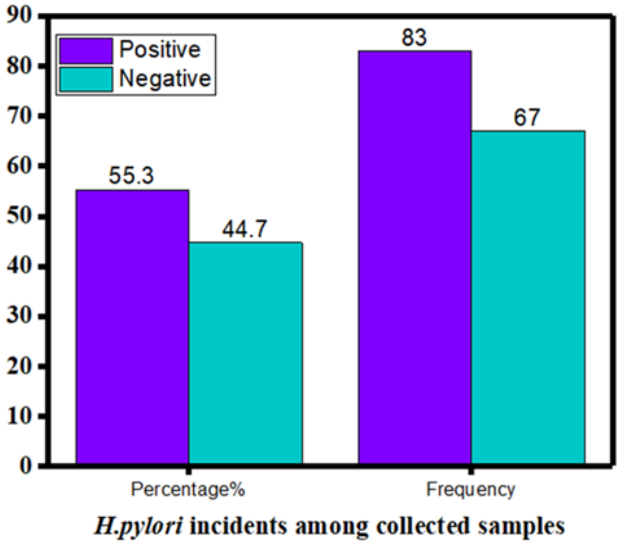

Figure 3. Frequency and percentage of *H.pylori* incidence among collected samples.

Samples were analyzed according to gender and family history, females were 62% (93/150) and 38% (57/150) were male shown in Table 1.

Table 1: Frequency and percentage with respect to gender of patients and family history

Variables	Samples tested	Gender		Family History	
	Total	Female	Male	Yes	No
Frequency	150	93	57	78	72
Percentage (%)	100	62	38	52	48

Further details about the treatment types i.e., allopathic, empirical, homoeopathic, or combined treatments which the patients were receiving or whether they completed their recommended doses or not, are shown in Table 2.

Table 2: Frequency and percentage of patients and different treatment types, combined treatment, and who complete recommended dosage.

Variables	Samples	Treatment Type			Combined Treatment		Dose Completion	
	Total	Allopathic	Empirical	Homeopathic	Yes	No	Yes	No
Frequency	**150**	112	16	22	61	89	58	92
Percentage (%)	100	74.67	10.67	14.67	40.7	59.3	38.7	61.33

For Lewis ABO Blood Groups analysis it was observed that patients having blood group O+ and B+ showed 25.3% (21/83) H. pylori-positive samples, followed by A+ were 14.46% (12/83), while AB+ 13.25% (11/83), B- = 10.84% (9/83), A- = 9.64% (8/83), and O- = 1.2% (1/83), while when seronegative patients were checked, it was observed that patients with blood group O+ were again with highest % 28.4%, with individuals (19/67), followed by A+ = 19.4% (13/67), B+ = 17.9% (12/67), AB+ =11.94% (8/67)y, B- = 10.4% (7/67), A- = 5.9% (4/67) and O- = 5.97% (4/67), but results were not significant when two-tailed p-value (p=0.5146) was calculated using t-test, as shown in Table 3.

Table 3. Prevalence of *H. pylori* and its trends in Lewis ABO blood groups

Blood group	Total Sample	*H. Pylori* infection	
		Positive	Negative
A+	25	12	13
B+	33	21	12
A-	12	8	4
B-	16	9	7
AB+	19	11	8
O+	40	21	19
O -	5	1	4
Total	150	83	67
Mean	-	11.86	9.57
SD	-	7.17	5.44
SEM	-	2.71	2.06
Two-tailed P value	-		0.5146

4. Discussion

Infection with H. pylori is thought to impact 50% of the world's population, and while it can occur in both industrialized and developing nations, its prevalence can reach over 70% in the latter.[15] The current study was a retrospective study of patients who attended OPD of District Headquarters, Haripur, for the symptoms of dyspepsia, gastric ulcers, acidity etc. either for first-time or repeated symptoms of H. pylori infection and treatment. These symptoms are usually shown when an individual gets infected with H. pylori, which is a micro-aerophilic, motile, gram-negative, and spiral bacillus bacteria forming circular convex translucent colonies. Biochemically, it is urease, catalase and oxidase positive, isolated for the first time in 1982 by Warren and Marshal.[16] H. pylori is majorly transmitted by fecal-oral route, poor hygienic conditions, overcrowding and lack of efficient disposal of sewage, which play an important role in increasing incidence in developing countries.[17] Blood type antigens present on red blood cells are permanently mounted and lifelong biological markers for any person that is just about an individual as fingerprints.[18] One genetic feature that has drawn attention as potential H. pylori infection risk factors is the ABO blood group, which has known polymorphic expression between individuals and populations. This theory was created based on earlier research that showed people with duodenal ulcers were more likely to have blood group O. Blood group O may also be a risk factor for developing H. pylori infection, as duodenal ulcer illness is 90–100% related to antral H. pylori infection. Due to several confounding circumstances, investigations on the association of ABO blood types with stomach cancer caused by H. pylori have produced inconsistent results.[19] This study aimed to investigate the association between ABO blood groups and their mode of secretion with peptic ulcers. The distribution of the ABO blood groups fluctuates in the population throughout the world. 150 participants including 93 females and 57 males between the age group of 18-60 years were involved in the study whose data was collected in the form of questionnaires. The H. pylori rapid diagnostic test was used to check the serum samples for antibodies (IgG) to the pylori bacteria. A macroscopic agglutination method was used to determine the phenotypes of Lewis and ABO antigens. All these parameters were analyzed individually, and then the prevalence of H. pylori and its trends in Lewis ABO blood groups were tested using Blood group * H. pylori cross-tabulation. All results were analyzed by SPSS version 19.

In recent research, it was found that there is a substantial link between H. pylori infection and ABO blood group, revealing that individuals with blood group O and B are more vulnerable to H. pylori infection. An analysis of multiple studies further supports the notion that blood type O may act as a predisposing factor for H. pylori infection.[20]

In research by Almorish et al., (2023), among 103 cases that tested positive for H. pylori, 34 individuals (33%) had blood group A, 7 individuals (6.8%) had blood group B, and a majority of 62 individuals (60.2%) had blood group O. This study provides affirmation that possessing blood type O is associated with a heightened susceptibility to H. pylori infection. The data derived from this study highlights a notable link between ABO blood groups. Earlier research has already established a connection between the antigens found in these blood groups and their impact on vulnerability to H. pylori colonization. More recent investigations indicate that these blood group systems may influence an individual's susceptibility to infection, the development of the disease, and their immune response.[21] Apart from investigating ABO blood grouping and H.pylori

infection across various genders, treatment modalities, etc., and comparing the results, we suggest conducting the study with a larger sample size to validate our results. It's necessary to be aware of the risk factors associated with the infection and to receive advice on the best preventative measures. Further research is needed to determine a relationship between blood type and H.pylori infection in different age groups. Treatment should be recommended for all patients who test positive for H. pylori. Healthcare stakeholders should urge people to maintain proper hygiene to stop the spread of H. pylori. H. pylori testing should be administered to patients who exhibit dyspepsia to facilitate more prompt and efficient management for those who test positive and prevent its spread. To determine the ABO blood group antigen's vulnerability and resistance to the illness, more research should be done.[15]

5. Conclusion

The study investigated the association between ABO blood groups and H. pylori infection. Findings revealed that H. pylori infection rates varied across different ABO blood groups, with blood group O+ and B+ individuals exhibiting higher rates of H. pylori positivity. This suggests a potential link between specific blood group types and susceptibility to H. pylori infection. Lewis ABO, blood group analysis, also indicated variations in H. pylori prevalence, emphasizing the importance of considering both ABO and Lewis antigens in understanding infection trends. These findings contribute to the body of knowledge regarding the potential role of blood group genetics in H. pylori susceptibility. In this study, the prevalence of H.pylori infection in females and males is comparable. Although some studies reveal higher rates in men than in women and vice versa, there is often no conclusive link between gender and H.pylori infection. Ultimately, understanding the interplay between blood group genetics and H. pylori infection may offer valuable insights into the development of targeted interventions and healthcare strategies for individuals at risk of peptic ulcers and related conditions.

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Contributions:

M - Conception of study

A.Z - Experimentation/Study Conduction

S.S - Analysis/Interpretation/Discussion

K.A - Manuscript Writing

A.I - Critical Review

A.S - Facilitation and Material analysis

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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