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Association between ABO blood group and Helicobacter pylori infection study in South India

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ABSTRACT

Introduction

There is no consensus among the existing literature on the relationship between ABO blood groups and risk of Helicobacter pylori infection. However, histo-blood group carbohydrates are proposed to influence the risk of acquiring this pathogen via effects on adhesion to the gastric mucosa. The objective of this study was to evaluate the association between ABO blood groups and H. pylori infection.

Aim and Objective

To study the incidence and prevalence of H.Pylori infections among the various blood groups.

Materials and Methods

- Study area- Thandalam
- Study period-January 2019- March 2019
- Study design-Prospective study
- Study population- Patients reporting for endoscopy with dyspepsia and other upper GI symptoms
- Sample size- 120 patients
- Sampling method- Simple random Sampling
- Data analysis- Descriptive statistics will be calculated for the variables using SPSS.

Result

In this study, 120 patients reporting to endoscopy division of gastroenterology department of Saveetha Medical College and Hospital were included. 55.8% of the participants were male and 44.2% of the participants were female. The general prevalence of Helicobacter pylori infection in the participants is 57.5%. The prevalence of H.pylori in A blood group is 26.7%, in B blood group is 21.7%, in AB blood group is 7.5%, O blood group is 44.2%. H pylori infections occur more in people with the O blood group ($p < 0.004$).

Conclusion

We observe a higher prevalence of H. Pylori infection in patients with O blood group. There are several studies, investigation which point towards this relation and establish a relationship between O blood group and H. Pylori infection.

INTRODUCTION

Helicobacter pylori

It's a gram negative spiral shaped pathogenic bacterium which inhabits the human gastric mucosa. The bacterium is present in approximately half of the worlds population, but it causes symptomatic disease in only 10-15% of those infected where it invades the gastric epithelial lining.

Prevalence of H.pylori in India

India is the prototypical developing country as far as Helicobacter pylori is concerned and more than 20 million Indians are estimated to suffer from peptic ulcer disease.

The prevalence of h pylori in the Indian subcontinent can be as high as 80% or more in rural areas. The most commonly recognised manifestation of H.pylori infection in India is peptic ulcer disease, particularly duodenal ulcer disease, which outnumbers gastric ulcers between 8:1 and 30:1. The population of Indians are approximately 1.2 billion. If the H. Pylori prevalence was 60%, more than 726 million individuals would be infected with h pylori. The estimated prevalence of duodenal ulcers is 3% and means that atleast 18 million people could need h pylori therapy.

Pathogenesis

H. pylori infection most often presents as a predominantly antral gastritis with normal or increased acid production. Local gastrin production may be increased, but hypergastrinemia (increased serum gastrin) is uncommon. When inflammation remains limited to the antrum, increased acid production results in greater risk of duodenal peptic ulcer. In other patients gastritis may progress to involve the gastric body and fundus. This multifocal atrophic gastritis is associated with patchy mucosal atrophy, reduced parietal cell mass and acid secretion, intestinal metaplasia, and increased risk of gastric

adenocarcinoma. Thus, there is an inverse relationship between duodenal ulcer and gastric adenocarcinoma that correlates with the pattern of gastritis.H. pylori organisms have adapted to the ecologic niche provided by gastric mucus. Its virulence is linked to certain factors like flagella, urease, adhesins, toxins.

Methods of diagnosis

The current gold standard to diagnose h.pylori infection invasively is two positive tests, which in India could be a combination of rapid urease test and examination of endoscopic biopsies by histology. The urea breath test is based on the generation of ammonia by the bacterial urease. The advantage of endoscopy is that symptomatic patients can be evaluated for mucosal disease. Endoscopy also allows one to take biopsy specimens that can be examined by histology, rapid urease tearing, brush cytology, or even culture. The other non invasive tests for active infection are urea breath test, stool antigen tests, and serology.

Distribution of the various blood groups in India

Across India, 1,342,561,902 people were surveyed. The percentage of people who have the 'O' blood group are 29.28%. The percentage of people who have the 'A' blood group are 28.42%. The percentage of people who have the 'B' blood group are 39.93%. Lastly, the remaining 9.42% of the population have AB blood group.

Relationship between O blood group and H. Pylori

Most of the research done on risk factors for H. pylori infection have focused on environmental and lifestyle factors (e.g. smoking and diet). However, recently as well as according this study, there's Increasing evidence for the role of genetic factors in susceptibility to H. pylori infection. One genetically determined trait with known polymorphic expression between individuals and populations that has attracted interest as potential

risk factors for H. pylori infection is ABO blood group. This premise was developed from previous studies showing a higher frequency of blood group O amongst patients with duodenal ulcer. Since duodenal ulcer disease is associated with antral H. pylori infection in 90–100% of cases, blood group O might also be a risk factor for acquiring H. pylori infection. ABO blood groups have also been investigated as risk factors for H. pylori associated gastric cancer, however there are conflicting studies due to multiple confounding effects. Since the discovery of the ABO blood group, there has been an ongoing interest in the potential role of blood groups in infectious disease. Blood group antigens are receptors for toxins, parasites, and bacteria, where they can facilitate colonisation or invasion or evade host clearance mechanisms. Previous studies demonstrated that blood-group antigen-binding adhesion (BabA) mediate adherence of H. pylori to human Lewis b (α -1,3/4-difucosylated) blood-group antigens on gastric epithelial cells.

During the last few decades, evidence for the role of ABO groups as potential risk factors for H. pylori infection has emerged from animal model studies and epidemiological data. H. pylori infection was found in some studies to be positively associated with O blood group, whilst others found no correlations.

Meta-analysis is a well-established method that pools data from smaller inconclusive studies to provide greater statistical power. Therefore, the current systematic review and meta-analysis of the relevant epidemiological literature aims to quantify the association between ABO blood group and H. pylori infection status.

MATERIALS AND METHODS

Study design and setting

The study design was a case control design adopted by the department of Gastroenterology (endoscopy) at a central hospital- Saveetha Medical College and Hospital.

Subject's recruitment and inclusion and exclusion criteria

A total of 120 patients who reported to the endoscopic division of Gastroenterology department of Saveetha Medical college and Hospital between January, 2019 – March 2019

were selected for the prospective study . A test group of 32 individuals belonging to the A blood group, another group of 26 individuals belonging to the B blood group, another test group of 9 individuals belonging to the AB blood group and lastly, a test group of 53 individuals belonging to the O blood group who came with the symptoms of dyspepsia or other symptoms deferrable to the proximal alimentary canal, from our outpatient gastroenterology- endoscopic department who were referred for serological diagnosis of H. Pylori infection.

The study was performed according to the local ethical committee of medical sciences. We excluded patients with history of taking eradication therapy of Helicobacter pylori positive infections within 6 months, patients with acute infection and gastro intestinal bleeding or patients with history of proton pump inhibitor or antibiotics intake within 2 weeks before the endoscopic procedure as these factors may result in false negative results for helicobacter pylori testing.

Variables and Clinical Procedures

The data for both groups included the demographics (age, gender), IP number, Blood group, symptoms on admission, provisional diagnosis, endoscopical and histological finding.

All patients underwent the endoscopic procedure with standard technique (using Olympus GF260, 9.6 mm diameter scope) to assess for HPPI test. Patient were lying in the left lateral position with a mouth piece placed and their throat sprayed with adequate xylocaine. Two antral biopsies were taken from antrum and lower body for each patient, as per the routine practice of the endoscopy unit, and submitted for histologic evaluation. No complication related to endoscopy was reported in any subject. The specimens were stained by hematoxylin and eosin stain or methylene blue. The laboratory investigator was blinded to the sample status to avoid bias.

ABO blood groups were determined for seropositive and seronegative patients, using standardized hemagglutination methods.

Statistical Analysis

Statistical Analysis was conducted using SPSS software. Descriptive analysis was conducted for the continuous and categorical variables. The different variables such as age, sex, height, weight, BMI, Helicobacter pylori positivity and negativity

were first independently calculated and represented in the form of frequencies and percentages. Chi square tests were conducted to explore the relationship of continuous and categorical variables with the dependent variable. A p value of <0.05 was considered significant.

RESULTS

Following are the sample characteristics and distribution of helicobacter pylori among the various blood groups

Frequencies

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	4.2	4.2	4.2
	20-29	22	18.3	18.3	22.5
	30-39	23	19.2	19.2	41.7
	40-49	22	18.3	18.3	60.0
	50-59	25	20.8	20.8	80.8
	60-69	14	11.7	11.7	92.5
	70-79	5	4.2	4.2	96.7
	80-89	3	2.5	2.5	99.2
	90-99	1	.8	.8	100.0
	Total	120	100.0	100.0	

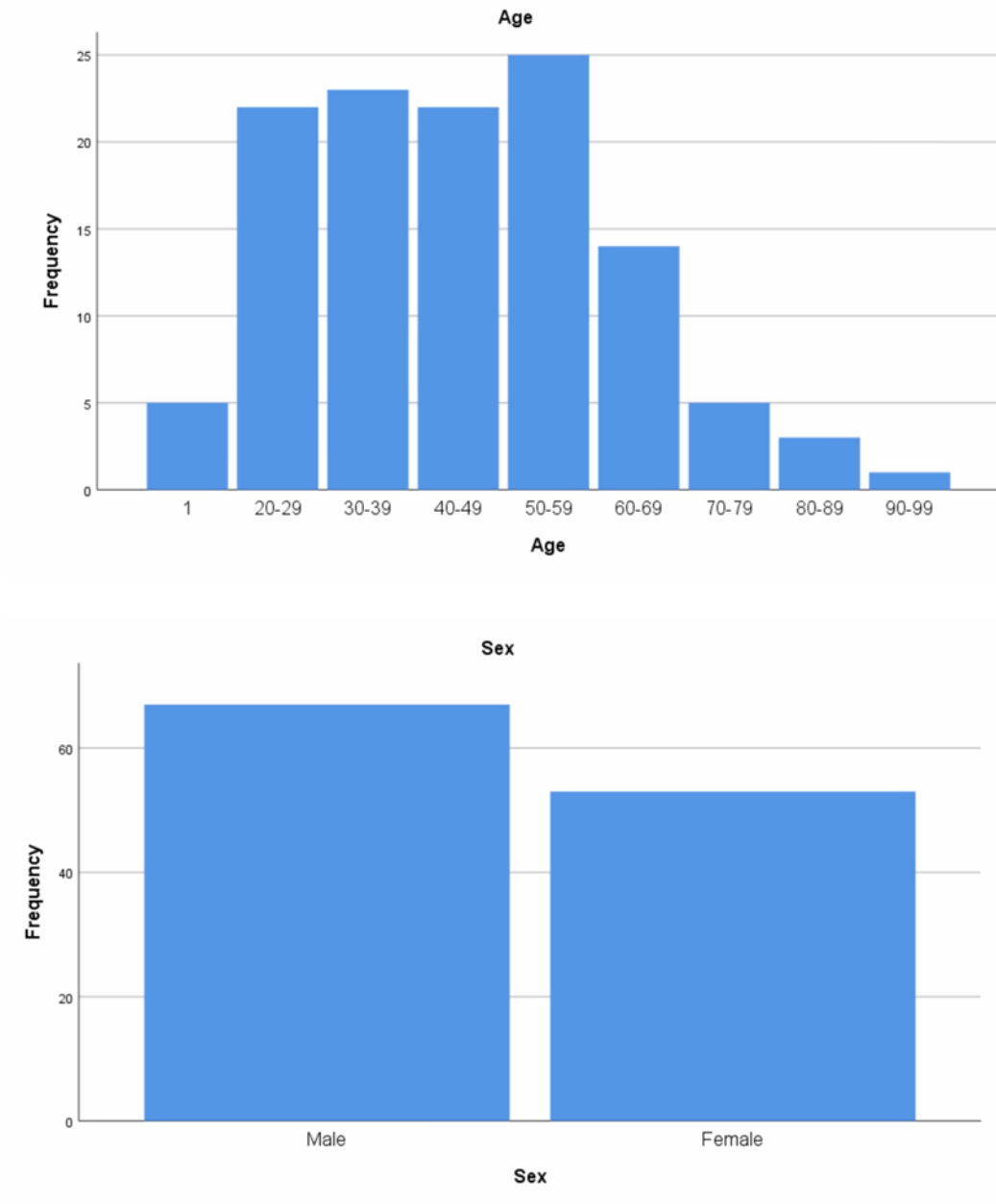
Sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	67	55.8	55.8	55.8
	Female	53	44.2	44.2	100.0
	Total	120	100.0	100.0	

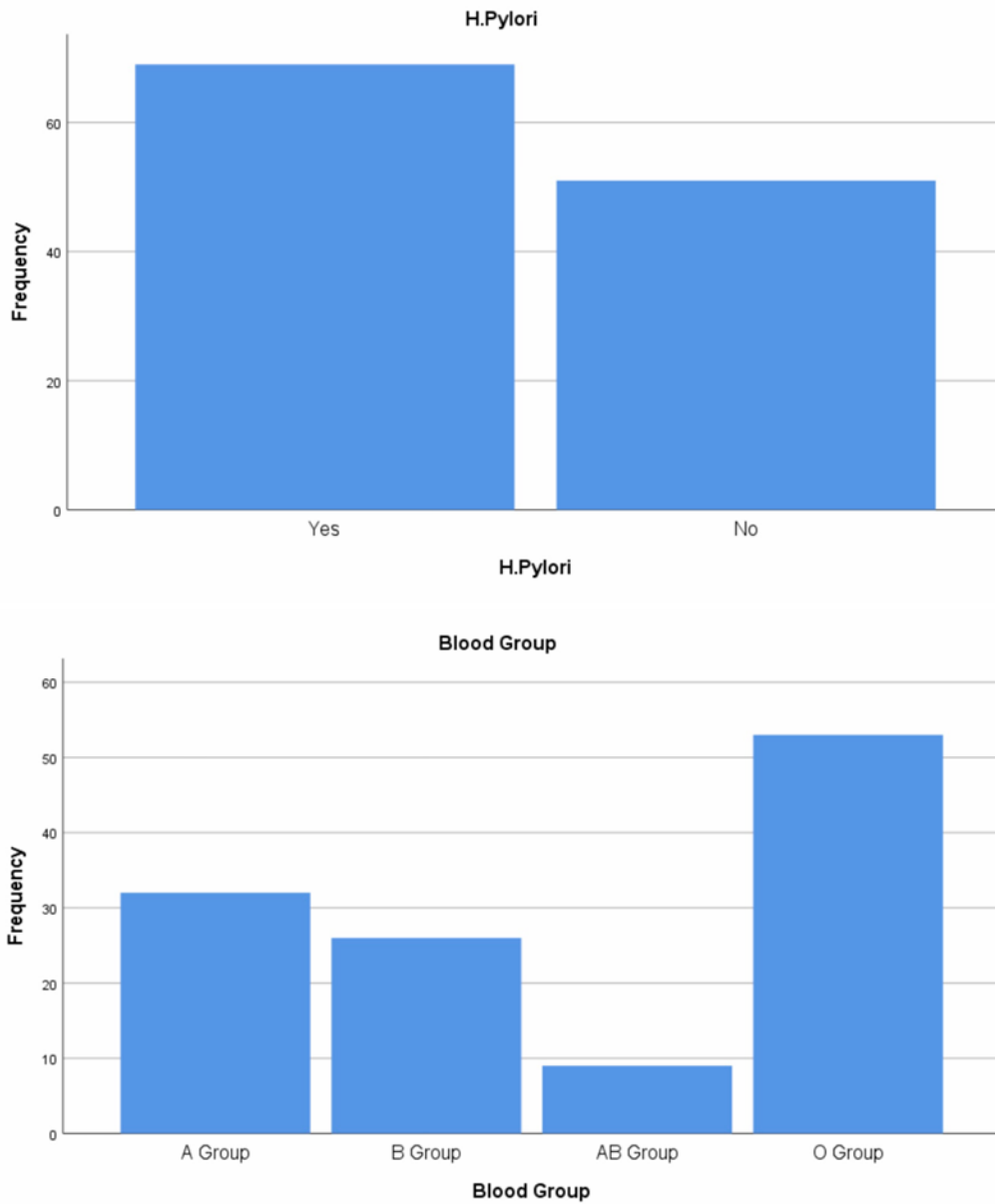
H.Pylori					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	69	57.5	57.5	57.5
	No	51	42.5	42.5	100.0
	Total	120	100.0	100.0	

Blood Group					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A Group	32	26.7	26.7	26.7
	B Group	26	21.7	21.7	48.3
	AB Group	9	7.5	7.5	55.8
	O Group	53	44.2	44.2	100.0
	Total	120	100.0	100.0	

Bar Graphs

Bar Chart





Chi square tests were conducted between the various variable like age, sex, blood group with respect to H. Pylori incidence.

Age*H pylori

Crosstab				
Count				
		H.Pylori		Total
		Yes	No	
Age	1	1	4	5
	20-29	12	10	22
	30-39	13	10	23
	40-49	12	10	22
	50-59	16	9	25
	60-69	10	4	14
	70-79	4	1	5
	80-89	1	2	3
	90-99	0	1	1
Total		69	51	120

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.693 ^a	8	.464
Likelihood Ratio	8.270	8	.408
Linear-by-Linear Association	1.207	1	.272
N of Valid Cases	120		

a. 8 cells (44.4%) have expected count less than 5. The minimum expected count is .43.

Sex*H.pylori

Crosstab				
Count				
		H.Pylori		Total
		Yes	No	
Sex	Male	41	26	67
	Female	28	25	53
Total		69	51	120

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.847 ^a	1	.357		
Continuity Correction ^b	.539	1	.463		
Likelihood Ratio	.847	1	.358		
Fisher's Exact Test				.457	.231
Linear-by-Linear Association	.840	1	.359		
N of Valid Cases	120				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.53.
 b. Computed only for a 2x2 table

Crosstab				
Count				
		H.Pylori		Total
		Yes	No	
Blood Group	A Group	13	19	32
	B Group	11	15	26
	AB Group	5	4	9
	O Group	40	13	53
Total		69	51	120

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.203 ^a	3	.004
Likelihood Ratio	13.572	3	.004
Linear-by-Linear Association	12.226	1	.000
N of Valid Cases	120		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.83.

Blood group* H. Pylori

A P value of < 0.004 was obtained, proving the presence of a significant association between the O blood group and Helicobacter pylori incidence.

DISCUSSION

Results of this study showed a significant association between the O blood group and infection caused by H.Pylori (P<0.004), a finding which is reinforced by data from several other studies.

Blood group AB patients were less prone to H. Pylori infection according to this study, a finding which wasn't observed by other studies.

The findings of this study support the epidemiological view of the higher susceptibility of blood group O to infection by H. pylori, as well as support the conclusions of Alkout et al, who demonstrated that the H antigen represents an important receptor expressed in the gastroduodenal mucosal cells to which H. pylori adheres.

The findings of this study disagree with several previous studies which demonstrated that the O blood group did not represent a risk factor for H. pylori infection.

The difference in results of the previous studies maybe because of the various control population,

study methodology, diagnostic procedure, different geographical distribution, smaller sample size, asymptomatic individuals.

The prevalence of seropositivity will change between various countries as well as within the same country, according to the socioeconomic status, being higher among groups of a lower socioeconomic status.

In this particular study, H.pylori prevalence is 57.5% of the study population. In developed countries the prevalence is <40%, in developing countries it's around 80-90%.

More females than males are seropositive as seen by some other studies however certain other studies have noticed no such relation to gender. Some other studies have noticed the inverse I.e. The prevalence of h. Pylori was higher in males.

CONCLUSION

We observe a higher prevalence of H. Pylori infection in patients with O blood group. There are several studies, investigation which point towards this relation and establish a relationship between O blood group and H. Pylori infection.

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Conflict of interest: Author declares no conflict of interest.

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