Journal of College of Education for pure sciences(JCEPS)
Web Site: http://eps.utq.edu.iq/ Email: com@eps.utq.edu.iq
Volume 7, Number 3, September 2017

Study the Relationship between Helicobacter pylori Infection and ABO Blood Groups and Rh Status

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Abstract

This paper was aimed to investigate the association between the ABO blood groups and H. pylori infection and to determine how much endoscopic findings are predict for the presence of active H. pylori infection. One hundred and twenty dyspeptic patients (as diagnosed by endoscopy and confirmed by histopathology) and sixty apparently healthy individuals were enrolled in this study. All subjects were underwent ABO blood grouping and Rhesus (Rh) systems determination. The results reveals higher frequency present of blood type O and the lowest frequency present of blood types A and AB among H. pylori patients compared to positive control group. The endoscopic findings showed low sensitivity in the diagnosis of H. pylori associated gastritis. In conclusion, there are considerable positive relationship between H. pylori infection and blood type O.

Key Words: Helicobacter pylori, ABO Blood Groups, Rh System.

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دراسة العلاقة بين إصابة اللولبية البوابية ومجاميع الدم والعامل الريسي

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الخلاصة

أستهدفت هذة الدراسة للتحري عن العلاقة بين مجاميع الدم وإصابة اللولبية البوابية وكذلك لتحديد قابلية التشخيص المنظاري للتنبأ بإصابة اللولبية البوابية الفعالة. أدخل في هذة الدراسة مئة وعشرون مريضا مصاباً بعسر الهضم (مشخصة بالناظور والخزعة النسيجية) وستون من الأفراد الأصحاء ظاهرياً. تم تحديد مجاميع الدم والعامل الريسي لكل مجاميع الدراسة. أظهرت النتائج بان نسب عالية من مجموعة الدم O ونسب قليلة لمجاميع الدم A و AB بين مرضى اللولبية البوابية مقارنة بمرضى السيطرة الايجابية، بينما أظهرت نتائج التشخيص المنظاري بأنها ذات حساسية قليلة في تشخيص التهاب المعدة المتعلق ببكتريا اللولبية البوابية. الاستنتاجات الخاصة بهذة الدراسة تشير لوجود علاقة ايجابية واضحة بين إصابة اللولبية البوابية ومجموعة الدم O.

1- Introduction

H. pylori is one of the most common chronic bacterial infections in humans effecting more than half of the people in whole world and is recognized as a major etiological factor for several gastro-duodenal diseases, including active chronic gastritis (ACG), gastric ulcers (GU), duodenal ulcers (DU), gastric mucosa-associated lymphoid tissue (MALT) lymphomas and distal gastric cancer. All people colonized by H. pylori will virtually develop gastritis; however, only 15% of these colonized develop disease (Avilés-Jiménez et al., 2012). Pathogenesis depends upon strain virulence, host genetic susceptibility and environmental co-factors (Zahraa, 2007).

H. pylori infection triggers a vigorous immune response, resulting in high titers of H. pylori-specific antibodies (Abs) and this response is not sufficient for eradication of the pathogen and when remaining untreated with antibiotics, infection will remain for life (Mathijs et al., 2010).

H. pylori can recognize and bind to blood group antigens expressed on the surface of gastric mucosa, which may play critical role in persistence of infection (Takashi et al., 2014).

There has been some debate over whether or not H. pylori-related gastritis can be diagnosed by endoscopic observation. Until recently, the endoscopic features of H. pylori-induced gastritis and H. pylori-negative normal mucosa were unknown. Recent studies highlighted that the presence of H. pylori could be assessed on the basis of the macroscopic patterns, but it is still unknown how macroscopic findings are related to histomorphological changes and the presence of H. pylori in the gastric mucosa (Kazuyoshi et al., 2002, and Mohammad et al., 2007). This study was aimed to evaluate how much endoscopic findings are predict for the presence of H. pylori infection in reference to the histopathological findings.

In the present study, the rate of H. pylori infection, and the relationship between H. pylori infection and human ABO blood group systems were evaluated.

2- Materials and Methods

- Subjects : A total of 120 dyspeptic patients (80 males and 40 females with an age range of 18-80 years) attending the endoscopy unit at the Gastroenterology and Hepatology Teaching Hospital-Baghdad during the period from September 2015 to February 2016 were included in this study. Another group of 60 apparently healthy individuals (36 males and 24 females with an age range of 18-65 years) was included in this study as negative control group.
- Endoscopy and histopathology: The dyspeptic patients were underwent oesophageo-gastroduodenoscopy (OGD) (Endoscopy was done by gastroenterologist after overnight fast) and gastric biopsy was taken for histopathology from the antrum, incisura, and gastric body. Sections of

biopsy were processed and examined for histopathology findings according to the method previously described (Farmilo, and Ronald, 2001).

- Hematology: From each subject; 2-5 milliliter (ml) of peripheral blood was collected by vein puncture. The collected were placed in ethylene diamine tetra acetic acid (EDTA) tube for ABO blood grouping and Rhesus (Rh) systems determination by using Atlas anti-A, anti-B, anti-D slide, microplate and tube tests (Atlas Medical- England), ABO blood groups and Rh phenotype evaluations were carried out by standard hemagglutination assays.
- Statistical analysis: Statistical package for social sciences (SPSS) version 14 was used. Chi square test was used to test frequency distribution of categorical variables within groups of the study. Differences were considered statistically significance at p value <0.05.

3- Results

In this study for the purpose of simplifying the terms, the following abbreviations were used H. pylori-associated patients (HPP), non- H. pylori-associated patients (NHPP), negative control or healthy individuals (NC), gastritis (GS), gastric ulcer (GU), duodenal ulcer (DU), Helicobacter pylori (Hp), significance (S), frequency (FR), and not significance (NS). According to the basis of the histopathological findings, Table 1 demonstrates the groups classification of this study enrolled subjects.

Table (1) Classification of the study groups

Total Patients Underwent Endoscopy (n=120)						Healthy or Negative Control (NC)
Helicobacter pylori (Hp)-associated Patients			Non Hp-associated Patients or Positive Control (PC)			
№=106			№=14			№=60
GS	GU	DU	GS	GU	DU	
№=56	№=16	№=34	№=8	№=0	№=6	

Table 2 showed the sensitivity (32.1%), specificity (100%), positive predictive value (100%) and negative predictive value (17.3%) of endoscopic diagnosis of H. pylori gastritis referring to the histopathological diagnosis (as a gold standard diagnostic tool). The results in the table below showed only 18/56 (32.1%) had H. pylori gastritis among confirm (by histopathological examination) H. pylori gastritis cases. In the same table the results showed from 56 confirmed H. pylori gastritis cases there are 38 (67.9%) had no sign of H. pylori gastritis or had normal mucosa by endoscopy, also there 8 patient had no sign of H. pylori gastritis by endoscopy and histopathology examinations. For peptic ulcers patients, 50/56 (89.2%) with PU had histological H.

pylori gastritis, while 6/56 (10.8%) had not histological H. pylori gastritis. For GU patients; all patient with GU 16/16 (100%) had histological H. pylori gastritis, while DU 34/40 (85%) had histological H. pylori gastritis, and 6/40 (15%) had not histological H. pylori gastritis. The differences between endoscopic diagnosis of H. pylori gastritis and histological diagnosis H. pylori gastritis were significance ($p < 0.05$).

Table (2) Primary endoscopic and histopathological diagnosis

Endoscopic /Histopathological Diagnosis			Histopathology Hp GS ve+ FR(%)	Histopathology Hp GS ve- FR(%)	Total FR(%)	P-value
Endoscopy	HpGS	ve+	18(32.1)3)	0(0)	18(28.1)	<0.05*
		ve-	38(67.9)	8(100)	46(71.9)	
	Total		56(100)	8(100)	64(100)	
Endoscopy	Sensitivity		32.1			
	Specificity		100			
	PPV		100			
	NPV		17.3			
Endoscopic /Histopathological Diagnosis			Histopathology Hp GS ve+ FR(%)	Histopathology Hp GS ve- FR(%)	Total FR(%)	Matching Between Endoscopy and
Endoscopy	GU (16)		16(100)	0(0)	16(100)	<0.05*
	DU (40)		34(85)	6(15)	40(100)	
	Total (56)		50(89.2)	6(10.8)	56(100)	

PPV=Positive Predictive Value, NPV=Negative Predictive Value and * =Significant.

The results of ABO system in all study groups are demonstrated in table 3. The total frequency present of blood group O, A, B and AB were 64/180 (35.5%) 58/180 (32.3%) , 42/180 (23.3%) and 16/180 (8.9%) in all study groups, respectively.

The frequency present of blood type O was higher among HPP group (34%) compared to PC (0%), while the frequency present of blood type B was high among HPP group (30.2%) compared to PC (14.3%), and NC (13.3). The frequency present of blood type A and AB were higher in PC group (57.1%), and (28.6%) compared to HPP (28.3%), and (7.5%), and NC group (33.3%), and 4/60 (6.7%), respectively.

The Rh positivity was 166/180 (92.2%) in all study groups. The frequency present of Rh^+ was high in all study groups; (96.2%) in HPP, (85.7%) in PC, and (86.7%) in NC.

Table (3) Distribution of all study groups according to ABO system

ABO/Rh/ Groups	HPP	PC	NC	Total
	FR(%)	FR(%)	FR(%)	FR(%)
A	30 (28.3)	8 (57.1)	20 (33.3)	58 (32.3)
B	32 (30.2)	2 (14.3)	8 (13.3)	42 (23.3)
O	36 (34)	0 (0)	28 (46.7)	64 (35.5)
AB	8 (7.5)	4 (28.6)	4 (6.7)	16 (8.9)
Total	106 (100)	14 (100)	60 (100)	180 (100)
Rh +	102 (96.2)	12	52 (86.7)	166 (92.2)
Rh-	4 (3.8)	2 (14.3)	8 (13.3)	14 (7.7)

Among the HPP subgroups (Table 4), the frequency % of blood group O was high in GU subgroups (50%) compared to the A (12.5%), B (25%), and AB (12.5) blood groups, but the frequency % of blood groups A was high in GS (32.1%) and DU (29.4%) subgroups, compared to GU subgroups (12.5%). Other blood groups type showed slight different in the frequency % among HPP subgroups. The frequency present of Rh positivity was high in all HPP subgroups (GS (92.9%), GU (100%), and DU (100%)).

Table (4) Distribution HPP subgroups according to ABO system

ABO/Rh/ HPP	GS	GU	DU	Total
	FR(%)	FR(%)	FR(%)	FR(%)
A	18(32.1)	2(12.5)	10(29.4)	30(28.3)
B	16(28.6)	4(25)	12(35.3)	32(30.2)
O	18(32.2)	8(50)	10(29.4)	36(34)
AB	4(7.1)	2(12.5)	2(5.9)	8(7.5)
Total	56(100)	16(100)	34(100)	106(100)
Rh+	52 (92.9)	16 (100)	34 (100)	102
Rh-	4 (7.1)	0 (0)	0 (0)	4 (3.8)

4- Discussion

Although a large number of articles have discussed the relationship between H. pylori and gastric cancer (Kazuyoshi et al., 2002, and Haruma et al., 2000), endoscopic studies have barely touched on this issue, because the endoscopic findings of the normal stomach without H. pylori infection were not known. Some articles reported that endoscopic features were not sensitive indicators in the diagnosis of histological gastritis caused by H. pylori (Kazuyoshi et al., 2002).

The kind and frequency of endoscopic changes associated with gastritis in subjects infected with H. pylori are not known in details (Mohammad et al., 2007, and Khakoo et al., 1994). This study indicates that the endoscopic findings for H. pylori related gastropathy are nonspecific. We should actually look for the sensitivity, specificity, positive predictive value, and the negative predictive

value of endoscopic findings to decide whether we could accurately rely on them to predict H. pylori positivity. Our data indicates that the endoscopic findings not to be highly predictive for H. pylori diagnosis, which is compatible with some studies (Mohammad et al., 2007, Sauerbruch et al., 1984, and Fung et al., 1979).

Helicobacter pylori infection is major risk factor for chronic gastritis and gastric cancer. Some findings show increased frequencies of these diseases in individuals with type O blood (Takashi et al., 2014). Results in this study was in agreement with the results of other studies (Gaidaa et. al., 2016) which demonstrated that patients of blood group O were more prone to H. pylori infection (88.9%) than patients in other blood groups, and patients in the AB blood group were less prone to H. pylori infection (35.3%) as compared with patients in other blood groups. Consistent with these findings this study showed higher frequency present of blood type O among H. pylori infected patients in compared to PC group. These results are reinforced by data obtained from other researchers showing the greater susceptibility of blood group O to H. pylori infection (Kanbay et al., 2005, and Mattos et al., 2002). Previous studies demonstrated that epithelial cells of persons of group O bound significantly more H. pylori than did cells of persons of other blood groups. H. pylori express lipopolysaccharides on its outer membrane including blood group antigen-binding adhesion A (BabA adhesin) which causes adhesion of bacteria to gastric epithelium to and allow persistent colonization (Kanbay et al., 2005, Alkout et al., 2000, and Linde et al., 2002).

The result of the present study showed in table 3 the high incidence of blood type B among HPP in comparison to PC, and NC groups. The same result profile was reported in (Endale et al., 2014). In the same table the result showed lower frequency present of blood groups A, and AB among HPP compared to both control groups, consistent with this findings the same results reported in (Manal, 2013).

Regarding Rh status, the present study showed no differences between the infected patients and non-infected patients, indicating that the presence of H. pylori did not relate to the Rh factor which is in an agreement with previous study by (Petrovic et al., 2011).

Many authors reported an association between blood group O and H. pylori infection (Kanbay et al., 2005). While others failed to find such an association (Niv et al., 1996). The ABO phenotype has been linked with stomach ulcers, which are more common in group O individuals and gastric cancer, which is more common in group A individuals (Iodice et al., 2010). In agreement with these findings, the present study demonstrated higher incidence of H. pylori among patients of blood group O with GU (50%) as compared with A (12.5%), B (25%) and AB (12.5%) blood groups. These findings indicate that people of blood group O with GU are more susceptible to infection with H.

pylori as compared with other blood groups. The increased susceptibility to peptic ulceration among persons with blood group O was due to density of colonization of epithelial cells and higher inflammatory responses to H. pylori (Alkout et al., 2000).

In conclusions, the endoscopic findings are insensitive in detection of H. pylori related gastritis. There are considerable positive relationship between H. pylori infection and blood type O. The patient with blood type O may be coincides with a development of GU more than other blood types.

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