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Helicobacter pylori Seropositivity and the Severity of Coronary Artery Atherosclerosis

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Abstract

Background: A review of many kinds of literature has suggested the theory of infections to are a risk for atherosclerosis of the coronaries, many of medical researchers reported that Helicobacter pylori pathogenesis extends beyond the gastrointestinal system to be a risk factor for inflammatory-induced atherosclerosis including that of the coronary vessels.
Objective: To detect a relationship between the seropositivity of Helicobacter pylori bacteria in the blood with the severity of coronary artery atherosclerosis.
Patients and Methods: A total of 125 patients were taken in this study including both sex male and female with different age groups all of them admitted to cardiac center hospital in Erbil City in Iraq. Patients were suspected to have coronary artery atherosclerosis based on symptoms and primary cardiac diagnostic tools, Angiography was performed to confirm or exclude coronary artery lesions by catheterization in the cath lab of the hospital. Blood samples were taken from patients including the patients' group and control group and a C-reactive protein (CRP) test with Helicobacter pylori IgG antibody test was done for them by using an Enzyme-linked immunosorbent assay (ELIZA) apparatus. Coronary angiography Confirmed the presence of atherosclerosis and the severity of it according to the number of vessels and the degree of luminal stenosis.
Results: The results show that the most of patients with atherosclerosis (83.5%) a high level of C-reactive protein. Also, a positive significant correlation was detected between the Helicobacter pylori concentration and the number of narrowed vessels based on the results of this study Helicobacter pylori.
Conclusion: According to the results Helicobacter pylori has a significant risk predictor for the severity of coronary atherosclerosis. However, evidence on this fact is not sufficient which further studies are needed.
Keywords: H. pylori -- Helicobacter pylori, CAD –coronary artery disease, CRP –C-reactive protein

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Introduction

Ischemic heart disease is the number one reason for human death and morbidity throughout the world [1]. Ischemia of the heart muscle is due to coronary artery atherosclerosis which is why different names are given to this disease, coronary arteries are the vessels that provide the heart with its requirements from the nutrients and oxygen that may narrow by the pathology of atherosclerosis [2].

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Atherosclerosis is a pathological process that occurs in the arteries due to multiple factors that are regarded as a risk for the pathology. Among the well-known risk factors are diabetes mellitus, hypertension, smoking, hyperlipidemia age, and gender [3,4].

Up to now, many researchers have detected that *H. pylori* bacterial infection has an association with the process of arterial atherosclerosis leading to luminal narrowing despite that *H. pylori* is a bacterium and it generally inhabits the human gastrointestinal tract that leads to acute and chronic inflammation in the stomach or duodenum in a disease named peptic ulcer which is also a risk factor for gastric tumor and malignancies gastric cancer [5, 6].

Pathological findings suggest that infectious agents play a role in the pathogenesis of arterial atherosclerosis [7,8]. Therefore, some researchers have focused on that infection is a cause of the inflammatory processes that take part in the development of arterial atherosclerosis. lastly many studies have found the association of *H. pylori* bacterium with diseases outside the gastrointestinal tract, including atherosclerotic coronary artery diseases that lead to ischemia of the heart muscle [9].

H. pylori infection and its association with the pathogenesis of arterial atherosclerosis has been shown well in some research but it is not a risk factor for coronary artery atherosclerosis [10].

There is limited data about the correlation between *H. pylori* infection with atherosclerotic coronary artery diseases, in our study we couldn't refuse the association between *H. Pylori* and coronary artery diseases, but there was an association between atherosclerosis and *H pylori* seropositivity therefor more studies needed for the confirmation of this outcome.

H. pylori bacteria is a gram-negative microbe that colonizes the endothelium of the human gastrointestinal tract, however, there is evidence that this bacterium be associated with some extra-gastric pathologies such as the development of atherosclerosis [11].

Research-based on serological studies study observed that there is an association between *H. pylori* bacterial infection and arterial atherosclerosis, although the role of inflammation in the initiation of pathogenesis and the progression of atherosclerosis in the coronary vessels has been increasingly shown but still needs to be proven [12].

However, the relation between *H. pylori* infection and arterial atherosclerosis including coronary arteries is not well understood, furthermore it is not well known yet if this bacterial infection is accompanied by a more severe form of atherosclerotic coronary arterial disease, on the other hand the it is not well known if H. pylori infection has nay association with the classical risk factors as age, sex, family history, elevated blood pressure, smoking, high blood glucose and abnormalities in lipids. Furthermore, the association of *H. pylori* infection with the incidence or the severity of atherosclerosis in the coronary arteries is not well known (10)12.

Patients and Methods

A total number of 125 patients have been taken for this study including both sexes with different age groups all of them were admitted in to Surgical specialty hospital - cardiac center in Erbil City in Iraq. All patients suspected to have coronary artery

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diseases, so they underwent coronary angiography in catheterization laboratory in the hospital to confirm or exclude stenotic coronary artery diseases.

Among these patients 85 of them were found to have stenotic coronary arteries by angiography and they were classified with different degrees of severity so hey were regarded as a patient group while 40 of them were found have normal coronary arteries in the coronary angiography to regards as control group.

Blood samples were taken from all study groups including patients and the control group and CRP test with H. pylori IgG antibody test was done for them by using ELIZA apparatus.

Coronary angiography performed to determine the presence of atherosclerosis in the coronary arteries and its severity and the severity of coronary artery atherosclerosis were assessed according to the number of diseased vessels and the percentage of arterial stenosis with its anatomical importance [13].

Coronary angiography is a diagnostic procedure using X ray machines to detect atherosclerotic coronary arterial diseases by injecting a iodine based radiopaque contrast material, the flow of the blood across the vessels can be seen visually and analyses both by operator of the computers.

Statistical Analysis

Statistical package for social sciences (SPSS) version 19 program used to analyze the data. P-value of < 0.05 considered to be significant statistically.

Results

The study included two groups, the first was composed of 85 patients with atherosclerosis, and the second was composed of 40 patients with no atherosclerosis (control group). The mean age of the first group was 60.3 years and that of the control group was 61.2 years ($p = 0.675$). Table (1) shows no significant difference in the age distribution of the two groups ($p = 0.732$). Around two-thirds (65.6%) of the sample were males, and there was no significant difference between the groups in the gender distribution ($p = 0.759$) Table (1).

Table (1): Age and gender distribution

	Atherosclerosis	Control	Total	P
	No. (%)	No. (%)	No. (%)	
Age (years)				
< 50	13 (15.3)	7 (17.5)	20 (16.0)	
50-59	27 (31.8)	9 (22.5)	36 (28.8)	
60-69	26 (30.6)	15 (37.5)	41 (32.8)	
≥ 70	19 (22.4)	9 (22.5)	28 (22.4)	0.732*
Mean (SD)	60.3 (11.2)	61.2 (11.7)		0.675†
Gender				
Male	55 (64.7)	27 (67.5)	82 (65.6)	
Female	30 (35.3)	13 (32.5)	43 (34.4)	0.759*
Total	85 (100.0)	40 (100.0)	125 (100.0)	

*By Chi square test. †By unpaired t test

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It is evident in Figure 1 that the prevalence of H. pylori in the atherosclerosis group (64.7%) was higher than that of the control group (20%) and found to be statistically significant ($p < 0.001$).

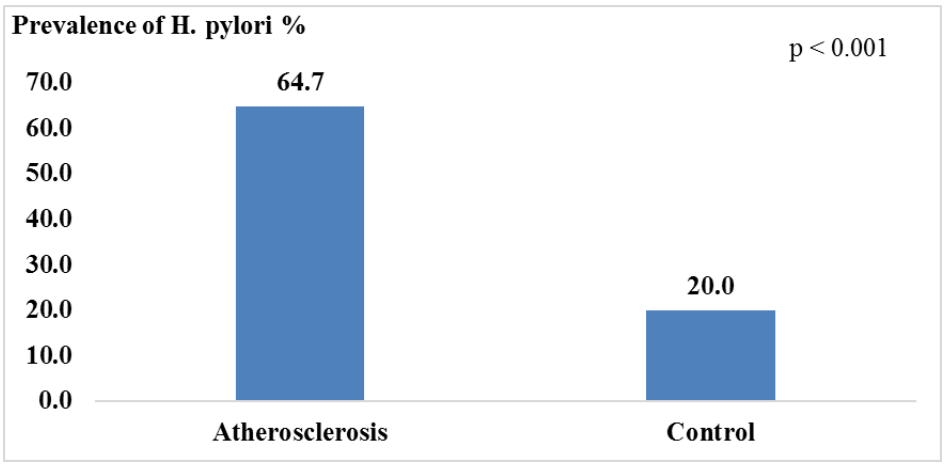

Figure (1): Prevalence of *H. pylori* among atherosclerotic patients and the control group

The majority (83.5%) of the patients with atherosclerosis had high CRP mg/ l level, compared with 10% of the control group ($p < 0.001$). The mean CRP was also higher in the patients than the controls ($p < 0.001$) Table (2).

Table (2): C- reactive protein (CRP) levels in the two study groups

	Atherosclerosi	Control	Total	
CRP	**No. (%)**	**No. (%)**	**No. (%)**	**P**
Normal	14 (16.5)	36 (90.0)	50 (40.0)	
High	71 (83.5)	4 (10.0)	75 (60.0)	< 0.001*
Mean (SD)	7.2 (2.0)	2.5 (1.6)		< 0.001†
Total	85 (100.0)	40 (100.0)	125 (100.0)	

*By Chi square test. †By unpaired t test

A positive significant correlation was detected between CRP values and the H. pylori concentration (rho = 0.575, $p < 0.001$) as presented in Figure (2).

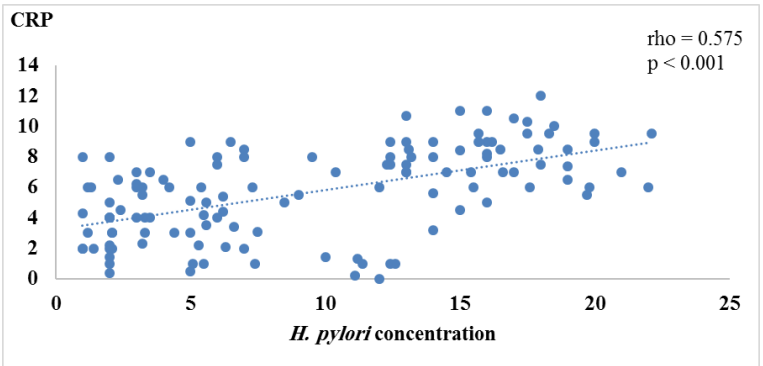

Figure (2): Correlation between CRP (mg/l) and H. pylori (U/ ml) concentration in the whole sample

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A positive significant correlation was detected between H. pylori concentration and the degree of the severity of atherosclerosis disease that depending on the number of vessels that were narrowing and the concentration of *H. pylori*.

Table (3): Association between H. pylori antibody concentration with the severity of coronary arterial diseases

	Severity of atherosclerosis (Mean±SD)				P. value
	Grade 1 (21)	Grade 2 (16)	Grade 3 (24)	Grade 4 (24)	
H pylori concentration	7.36±5.03	9.75±5.55	14.49±4.89	17.24±2.48	0.000

Discussion

In this study a relationship between *H. pylori* bacterial infection and coronary atherosclerosis with its severity was detected among patients who underwent coronary angiography and had documented coronary artery pathology. Although *H. pylori* infection is well known as a risk factor primarily for the occurrence of gastrointestinal pathologies (e.g. duodenal ulcers, Gastric ulcer or gastric carcinoma), its association with different types of extra gastric pathologies has been studied. This study found a significant relationship between patients with coronary atherosclerosis and its severity in patients having positive of *H. pylori* antibodies.The positive correlation was between *H. pylori* bacterial antibody titer with the presence of coronary artery atherosclerosis and its severity as shown in Table (3), depending on the degree of luminal stenosis and the number of diseased arteries [12].

Though Anita et al., 2017 [14] found no correlation between H. pylori infection and the degree of arterial atherosclerosis but Mendall et al., 1994 [15] observed significant evidence between *H. pylori* antibody and atherosclerosis in the coronary vessels. Hence *H. pylori* bacterial infection has been claimed to play an important role in the development of coronary arterial atherosclerosis.

Furthermore Niccoli et al., 2010 [16] also found an association between antibody titer of *H. pylori* and the severe form of coronary artery disease. more similar to the current study result Park et al., 2011 [17] observed a positive relation between *H. pylori* antibody seropositivity and premature atherosclerosis in the coronary vessels all suggesting a possibility that *H. pylori* infection may initiate atherogenesis and progress the pathology continually to cause more severe stenosis in many arteries.

Furthermore, in the available results found in our study it has been found that H.pylori infection can be regarded as a risk factor for coronary artery diseases and its severity a finding that shown in earlier researches [18].

Conclusions

According to the results of this study H. pylori antibody seropositivity was proportionally and significantly associated with coronary artery atherosclerosis and its severity.

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Recommendations

However, evidences on this correlation are not sufficient. Therefore, further researches on this subject are needed to improve that infection with H. pylori bacteria has a significant effect to increase the severity of coronary heart diseases.

Source of funding: The current study was funded by our charges with no any other funding sources elsewhere.

Ethical clearance: The local College of Medicine Ethics Committee gave its approval to the study protocol at Hawler Medical University (HMU). Informed consent in writing was obtained from each participating patient.

Conflict of interest: Nil

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الايجابية المصلية للبكتريا المعوية هليكوبكتر بايلوري و خطورة مرض تصلب الشرايين(الشرايين التاجية)

صلاح حسن يوسف[1]

الملخص

خلفية الدراسة: العديد من البحوث السابقة قد طرحت موضوع ان الاصابة بالمكروبات مثل البكتريا او الفايروسات لها علاقة مباشرة مع الاصابة بتصلب الشرايين من ضمنها الشرايين التاجية لما تسببه من جراحات في جدار الاوردة الدموية لذلك من خلال هذا البحث الذي اجريته.

اهداف الدراسة: لقياس نسبة الايجابية المصلية البكتريا المعوية لدى المرضى المصابين بتصلب الشرايين **Helicobacter** pylori.

المرضى والطرائق: و لقد تضمنت طرقة اجراء البحث فحص الايجابية السيرم ل 125 مريض بتصلب الشرايين و تم اجراء لهم عملية القسطرة في مستشفى القلبية في محاظة اربيل حيث تم تشخيص مرض تصلب الشرايين لدى هؤلاء المرضى. و تم استخدام جهاز اليلايزا لقياس نسبة الاجسام المضادة للبكتريا المعوية.

النتائج: و لقد بينت النتائج بان نسبة عالية من مرضى تصلب الشرايين لديهم الايجابية المصلية عالية للبكتريا المعوية (67%). وكذلك نسبة(83.5%) من هولاء المرضى التصلب الشرايين لديهم ارتفاع في مستوى البروتين الكبدي من نوع سي. وكذلك تم ايجاد علاقة معنوية احصائيا عالية بين المرضى بعلاقة طردية كلما ازدات نسبة الايجابية المصلية للبكتريا المعوية ازداد خطرة المرض حسب تقارير التشخيص القسطري.

الاستنتاجات: و بذلك تم الاستنتاج من خلال هذه الدراسة ان وجود نسبة عالية من الايجابية المصلية للبكتريا المعوية من الممكن ان تسبب الزيادة في الاصابة بامراض تصلب الشرايين او تسبب ازدياد نسبة خطورة مرض لدى المصابين بتصلب الشرايين.

الكلمات المفتاحية: *H. pylori* - Helicobacter pylori, CAD, مرض الشريان التاجي، بروتين C– CRP التفاعلي

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