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The Rate of Anti-*Chlamydia Pneumoniae* IgG and IgA Antibodies Among Patients With Coronary Heart Diseases in Diyala Province, Iraq

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Abstract: *Background: Chlamydia pneumoniae* is found worldwide, it causes acute respiratory infection, especially atypical pneumonia. High prevalence of past infection with *Ch. pneumoniae* have been found in developing countries that may has a role in pathogenesis of coronary heart disease. *Objective:* The present study was sought todetermined the rate of anti- *Ch. pneumoniae* IgG and IgA antibodies among patients with coronary heart diseases in Diyala province, Iraq. *Material and Methods:* This study was conducted during the period from November/ 2013 to December/ 2014. 91 Participants were included; 45 patients with coronary heart disease (myocardial infarction, angina, and atherosclerosis) who were chosen according to clinical criteria and 46 apparently healthy individuals as control group. The mean age of the patients was (59.20 ± 11.45) years with an age rang (40-90) years, and for the controls, and the mean age was (35.43 ± 8.67) years with an age rang (32-86) years. Detection of anti- *Ch. pneumoniae* IgG and IgA antibodies was done by Enzyme – Linked Immunosorbant Assay (Nova Tec immundiagnostica GmbH, Germany). *Results:* The present results study show that the positivity rate of anti-*Ch. pneumoniae* IgG antibodies was significantly higher among patients compared to controls (66.67%*vs*54.35%, $P \leq 0.05$). While, the seroprevalence of anti- *Ch. pneumoniae* IgA antibodies among patients and controls was 24.44%and 13.04% respectively, this results showed that there is a statistically significant association between *Chlamydia pneumoniae* and CHD, $P \leq 0.05$. *Conclusion:* The presence of anti-*Ch. pneumoniae* IgG and IgA are significantly associated with CHD patients in Diyala province.

Keywords: Coronary Heart Diseases, *Anti-Ch. Pneumoniae* IgG and IgA, Diyala

1. Introduction

Chlamydia pneumoniae is a major cause of human respiratory diseases among children and adult. It is a ubiquitous Gram's negative obligate intracellular pathogen that is responsible for 5-10% of pneumonia cases in adult worldwide [1]. *Ch. pneumoniae* also can survive and multiply within the cells of the human vascular wall and their association with coronary heart diseases (CHD) has been reported earlier [2,3]. CHD is the most common type of heart disease that remains a major cause of morbidity and mortality in the industrialized world and become increasing in developing countries [4]. In addition to *Ch. pneumoniae*, several infectious agents that resulting in chronic infection such as *Helicobacter pylori*, Cytomegalovirus and Herpes Simplex Virus (HSV), have been a probably related with CHD or atherosclerosis by contribute to increases risk of the pathogenesis of CHD [5].

The association of *Ch. pneumoniae* with atherosclerosis and coronary heart disease has been based upon 4 research areas; seroepidemiological studies, detection of the pathogen in diseased arteries, experimental studies *in vitro* and in animal models, and human intervention trials with antibiotics [5,6,7]. An overwhelming number of seroepidemiological studies have suggested that *Ch. pneumoniae* as detected by the presence of their antibodies may be related to the development of atherosclerotic disease [8,9,10,11]. In this context, a significantly higher seropositivity to *Ch. pneumoniae* immunoglobulin IgA and IgG in patients with CHD, diabetic patients with unstable angina, young patients

with stroke and patients with acute myocardial infarction [12,13,14,15]. Moreover, the polymerase chain reaction (PCR) which is highly precise laboratory tool has also been used to identify *Ch. Pneumonia* DNA in atherosclerotic plaques and in patients with CHD [16,17].

It has been suggested that chronic infection of *Ch. pneumoniae* may contribute to the development of CHD by increasing the concentrations of acute phase reactants such as C-reactive protein, heat shock proteins 60, fibrinogen, inflammatory markers such as interleukin7 and sialic acid which are predictors of CHD [18,13,19]. Furthermore, it has been demonstrated an association between Chlamydia lipopolysaccharide–IgA (LPS-IgA) seropositivity and elevated levels of interferon-gamma (IFN-γ), interleukin- 10 (IL-10), tumor necrosis factor-alpha (TNF-α), soluble vascular cell adhesion molecule (sVCAM-1) and soluble E-selectin(sE-selectin) in CHD patients that might indicate persistent Chlamydia infection and a proinflammatory state [5,20,21].

On the contrary, several other studies have failed to proof the association of *Ch. Pneumonia*e infection with CHD [22,23,24]. Therefore, a third opinion suggest that establishing a causal relationship between *Ch. peumoniae* infection and cardiovascular disease requires more prospective studies with combination of techniques and stratified by etiological subtypes [25].

2. Subjects and Methods

The present study is a cross sectional case control study. It was conducted in Baqubah- Diyala province during the period from November / 2013 to December / 2014, and approved by the Diyala Health Directorate, Department of Research and Development. Informed consents were obtained from all participants, certain demographic factors and information of risk factors of CHD such as age, gender, and previous history of CHD, hypertension, diabetes mellitus and status of smoking was collected from patients by short personal interview. The study included 91 participants were divided into two groups; the patient group, consist of 45 patients with CHD (myocardial infarction, angina, atherosclerosis) who were chosen according to clinical criteria. They were either inpatients admitted to Baqubah General Teaching Hospital or outpatients attending the outpatient' clinic. The mean age was (59.20 ± 11.45) years with an age rang (40-90) years. The healthy control group, includes 46 healthy individuals of both sexes, selected randomly, the mean age was (35.43 ± 8.67) years with an age rang (32-86) years. Three milliliters of venous blood was drawn from each participant by vein punctures in plan plastic tubes. Sera were separated by centrifugation at 3000 rotation / minute for 5 minutes, and stored frozen until examination. Detection of anti- *Ch. pneumoniae* IgG and IgA antibodies was done by Enzyme – Linked Immunosorbant Assay (Nova Tec immundiagnostica GmbH, Germany). Testing procedure and interpretation of the results were followed the manufacturer's instructions. Statistical analysis was performed using SAS version -11 Ed. (Inc, Cary, NC, USA).Chi-square test was used to compare between patients and controls, P value of < 0.05 was considered significance.

3. Results

Ninety one participants were included in this study. The mean age ± SD of the patients was 59.20 ± 11.45 years, with age range 40-90 years. The mean age ± SD of the healthy controls was 35.43 ± 8.67 years, with age range 32-86 years. The seropositivity of anti- *Ch. pneumoniae* IgG antibodies among study groups revealed that 30(66.67%) patients and 25 (54.35%) of healthy control were positive with a statistically significant difference between the two groups ($P< 0.05$), table (1).

Table 1. *Seropositivity of anti- Chl. pneumoniae IgG antibodies among study groups*

Study participants	Anti- *Chlamydia pneumoniae* IgG antibodies				Total
	Positive (%)		Negative (%)		
Patients	30	66.67	15	33.33	45
Controls	25	54.35	21	45.65	46
Total	55		36		91

$P < 0.05$[S]

The seropositivity of anti- *Ch. pneumoniae* IgA antibodies among study groups was revealed in table (2). 11 (24.44%) patients and 6 (13.04%) healthy controls were positive, with a statistically significant difference between the two groups, $P < 0.05$.

Table 2. *Seropositivity of anti- Chl. pneumoniae IgA antibodies among study groups*

Study participants	Anti- *Chlamydia pneumoniae* IgG antibodies				Total
	Positive (%)		Negative (%)		
Patients	11	24.44	34	75.56	45
Controls	6	13.04	40	86.96	46
Total	17		74		91

$P < 0.05$[S]

4. Discussion

Coronary heart disease is caused by multiple factors. A part from the role of conventional risk factors for cardiac disease, *Ch. pneumoniae* has been proposed to be one of the infectious causative factors [26,27].Association between *Chlamydia pneumoniae* and coronary heart disease has been detected by both seroepidemiological studies and by direct detection of the microorganism in atherosclerotic lesion, most of these studies reported propose an association but few studies reported negative results, this study which conducted in Diyala province, Iraq , by using ELIZA technique, is one of the recent studies that confirmed the association between *Chlamydia pneumoniae* and CHD [6]. The present results

showed that the seropositivity rate of anti- *Ch. pneumoniae* IgG and IgA antibodies was significantly higher among patients compared to healthy controls. Many studies in the literature reported different results, the present results are consistent with previous studies; Ali *et al*., [28], demonstrated by using microimmunofluorescence technique, a rise in *Chl. pneumoniae* IgG antibodies levels among CHD patients. In Iran, Azarkar *et al*., [29], found that the prevalence of anti- *Chl. pneumoniae* IgG antibodies was 63 (71.9%) among patients with acute myocardial infarction and 23(46.9%) in control group (P<0.01). Ashkenazi *et al*., [30], suggested that chronic *Ch. pneumoniae* infection play a role in the pathogenesis of atherosclerosis and acute ischemic event when they found a high titer of IgG antibody in patients with acute myocardial infarction compared to controls. In Saudi Arabia, Momenah and Tayeb, [31], reported that *Ch. pneumoniae* infection play an important role in increase of CHD in the Saudi community when they found a significant correlation between anti- *Ch. pneumoniae* IgG antibodies and CHD. Additionally, In a study conducted in India, Agarwal *et al*., [6], reported that the seroprevalence of anti- *Ch. pneumoniae* IgG antibodies was a significant higher among patients (76%) with CAD in a compared to controls (59%). Similarly, In Italy, Monno *et al*., [32], found by using microimmunofluorescence technique a high prevalence of IgG antibodies at titer ≥8 was (84%) among patients with cardiovascular disease compared to control group (47.6%).

Regarding of anti- *Chl. pneumoniae* IgA antibodies, our results are concordant with many studies; for instance, Haider *et al*., [21], reported a high prevalence of anti- *Chl. pneumoniae* IgA antibodies was detected among patients with CHD (66.66%) in comparison with control group (14.37%). In Japanese study, Sakurai-Komada *et al*., [33], showed a high positivity of anti- *Chl. pneumoniae* IgA antibodies associated with a risk of CHD, specifically among myocardial infarction patients. Likewise, other studies found a strong association between CHD and anti- *Ch. pneumoniae* IgA antibodies [34]. Arcari *et al*., [34], found a significantly higher risk of AMI in patients who had high titers to *Ch. Pneumoniae* immunoglobulin A (IgA).

5. Conclusion

The present results supports the contention of positive association of *Ch. Pneumoniae* infection and the development of CHD and suggest the need for a new medical visions to demonstrate the effect of *Ch. pneumoniae* on the pathogenesis of coronary heart disease.

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