Chlamydia pneumoniae seropositivity and risk of developing coronary heart disease in Western Saudi Arabia

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ABSTRACT

Objectives: To estimate the seroprevalence of IgG and IgA antibodies against Chlamydia pneumoniae (C. pneumoniae) among a sample of the Saudi population, and to evaluate whether there is a relationship between seropositivity to chronic infection with C. pneumoniae and the manifestation of symptomatic coronary heart disease (CHD).

Methods: We collected 273 sera samples from CHD patients and 273 sera samples from healthy matched controls from the Western region of Saudi Arabia during the period from November 2004 to May 2005. We tested anti-chlamydial IgG and IgA antibodies using enzyme-linked immunosorbent assay technique.

Results: We found 239 (87.5%) patients and 213 (78%) controls positive for C. pneumoniae IgG antibodies. However, 58 (21.2%) patients and 55 (23.9%) controls were positive for C. pneumoniae IgA antibodies. These results indicate a significant correlation between the presence of IgG antibodies and the development of CHD (p=0.003). Data of this study showed that the presence of IgG antibodies has a 2-fold increase risk in development of CHD. We found no significant correlation between the existence of IgA antibodies and CHD.

Conclusion: Our study indicates that C. pneumoniae infection plays an important role in the development of CHD in the Saudi community, emphasizing the importance of developing strategies for prevention and control against this type of bacterial infection. However, we need further study throughout the Kingdom to approve these results in all regions.
infection positively associate with CHD. As then, over 30 seroepidemiological studies worldwide demonstrated an association between raised *C. pneumoniae* serological markers such as immunoglobulins (Ig) and immune-complex, and various atherosclerotic vascular diseases. Most of these seroepidemiological studies are cross-sectional, case-control studies. They have demonstrated at least a 2-fold increased risk of adverse cardiovascular events with raised serological markers factors. Although, most seroepidemiological studies show a correlation between *C. pneumoniae* and CHD, there are also reports of some negative seroepidemiological studies. These negative studies concluded that there was no strong association between *C. pneumoniae* IgG titre and the incidence of CHD, and called for further studies to verify any modest association that may exist. The aim of this study is to estimate the seroprevalence of *C. pneumoniae* among a sample of the Saudi population, and to evaluate whether there is a relationship between seropositivity to chronic infection with *C. pneumoniae* and the manifestation of symptomatic CHD.

**Methods.** Samples. We collected 5 ml of venous blood from all Saudi participants in this study and stored the samples in plain tubes. A total of 546 serum samples (from the Saudi population) were collected from 273 patients undergoing therapy for advanced CHD and 273 healthy individuals, during the period from November 2004 to May 2005. The study was carried out at the following hospitals in Makkah and Jeddah cities (Al-Noor Specialist Hospital [560 beds], King Abdul-Aziz Hospital [272 beds], and General King Fahad Hospital [710 beds]). The desired information was obtained from every patient and recorded in the form. The information recorded includes; age, gender, hypertension, diabetes mellitus status, previous myocardial infarction, cholesterol level, CHD family history and smoking habit.

**Enzyme-linked immunosorbent assay (ELISA) test.** The ELISA automated system (CARO Diagnostic GmbH, Germany) was used to determine the prevalence of IgG and IgA antibodies in both healthy and CHD patients according to the manufacturer recommendation (NovaTec, Germany). The samples were diluted with the sample diluent to obtain a 1:100 dilution.

**Statistical analysis.** Data were recorded and analyzed using SPSS (version 10). Chi-square test was used to compare frequencies of IgG and IgA antibodies in case and control populations. The odds ratio (OR) for risk of CHD with IgG positive was calculated using Stat 1.0 software. T-test were performed to determine differences between case and control populations regarding age using SPSS (version 10).

**Results.** T-test revealed no significant difference between case and control populations regarding age.

**Coronary heart disease in relation to traditional risk factors.** The study showed that hypertension, smoking, obesity, high cholesterol level, and smoking are all statistically correlated with CHD cases in comparison with control cases (*p*<0.05).

**Coronary heart disease in relation to IgG level.** Sera from 239 CHD patients (87.5%) showed IgG antibody response to *C. pneumoniae*. However, sera tested from the control group showed a response in 213 cases (78%) (*Table 1*). The data obtained showed a highly statistically significant correlation between the existence of IgG antibody against *C. pneumoniae* and CHD (*p*=0.003). The risk of developing CHD in individual displaying IgG positivity was 2 (OR=2, 95% CI=1.25-3.14).

**Coronary heart disease in relation to IgA level.** Sera from 58 CHD cases showed IgA antibody response to *C. pneumoniae* representing 21.2% from the total samples tested. However, sera tested from the control group showed a response in 65 cases (23.9%) (*Table 1*). The data obtained showed no statistically significant correlation between the existence of IgA antibody against *C. pneumoniae* and CHD (*p*=0.540).

**Coronary heart disease in relation to combination of IgA and IgG levels.** There was no significant difference between case and control populations regarding age.

*Table 1* - Immunoglobinulin (Ig) G and IgA levels in relation to coronary heart disease cases and control.

<table>
<thead>
<tr>
<th>Populations</th>
<th>IgG positive (%)</th>
<th>IgG negative (%)</th>
<th>IgA positive (%)</th>
<th>IgA negative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study samples (n=273)</td>
<td>239 (87.5)</td>
<td>34 (12.5)</td>
<td>58 (12.2)</td>
<td>215 (78.8)</td>
</tr>
<tr>
<td>Control samples (n=273)</td>
<td>212 (78)</td>
<td>60 (22%)</td>
<td>65 (23.9)</td>
<td>208 (76.1)</td>
</tr>
<tr>
<td><em>p</em>-value</td>
<td>0.003</td>
<td></td>
<td></td>
<td>0.540</td>
</tr>
</tbody>
</table>

they have a short half life, which is only 5-7 days and they usually decline rapidly following treatment of the chlamydia infections while IgG antibodies persist for long periods.23,24

In conclusion, we should consider the significant correlation between C. pneumoniae IgG and risk of developing CHD achieved by this study in order to develop potential targeted antimicrobial treatments and possibly vaccines for C. pneumoniae infection aiming to decrease the risk of developing CHD. However, we should perform a national survey on the association between C. pneumoniae and CHD throughout the Kingdom before applying these preventive actions, as no such national data are currently available.

References


