Chlamydia pneumoniae seroprevalence in immunocompetent and immunocompromised populations in Milan

F Blasi, R Cosentini, M Clerici Schoeller, A Lupo, L Allegra

Abstract

Background—Chlamydia pneumoniae is drawing increasing attention as an agent of respiratory tract infection. Specific antibody prevalence in western countries is low in preschool children and reaches more than 50% in adults. However, little is known about the prevalence of this infection in immunocompromised subjects such as HIV-I infected patients. The aim of this study was to evaluate the seroprevalence of Chlamydia pneumoniae in immunocompetent and immunocompromised (HIV-I infected) paediatric and adult populations.

Methods—Between March 1991 and September 1992 764 healthy subjects (421 men and 343 women, age range six months–81 years), 96 HIV-I infected (73 men and 23 women, age range 18–35 years) and 126 HIV-I negative intravenous drug users (92 men and 34 women, age range 18–37 years), and 50 children (23 boys and 27 girls, age range 8–123 months) with vertically transmitted HIV-I infection were studied. For each subject an HIV-I test (ELISA and Western blot) was performed, together with a microimmunofluorescence test for IgG and IgM antibodies to Chlamydia pneumoniae specific antigen (TW-183).

Results—In the healthy population a low prevalence (11%) was observed in children under 10 years of age, which increased progressively to 58% in adults over 70 years. In the HIV-I infected population Chlamydia pneumoniae seroprevalence was higher than in immunocompetent controls (children, 26% v 11%; drug users, 60% v 40%). Moreover, in drug users this difference was also observed in comparison with HIV-I negative intravenous drug users (60% v 33%).

Conclusions—Our data on Chlamydia pneumoniae seroprevalence in a healthy population are consistent with those reported by others in western countries. Moreover, HIV-I infected subjects seem to be at higher risk of developing Chlamydia pneumoniae infections.

(Thorax 1993;48:1261–1263)

Chlamydia pneumoniae is a recently recog-
The study was approved by the ethical committee of the University of Milan. We performed an HIV-I test (ELISA and Western blot) together with a microimmunofluorescence test\(^7\) for IgG and IgM antibodies to \textit{Chlamydia pneumoniae} specific antigen (TW-183) prepared by the Washington Research Foundation, Seattle, USA, on each subject. Microimmunofluorescence results were classified as previously reported\(^6\): threshold titre positivity for IgM and IgG were >1:16 and >1:64, respectively.

**STATISTICAL METHODS**

Comparison of seroprevalence of \textit{Chlamydia pneumoniae} was performed with Fisher’s exact test or \(\chi^2\) test.

**Results**

The seroprevalence of \textit{Chlamydia pneumoniae} in the healthy population is shown in the figure. There was a low prevalence (11%) in normal children under 10 years of age which increased progressively to 58% in adults over 70 years. Males showed a higher prevalence at all ages with the exception of children under 10 years (~12%). The greatest difference (+21%) was observed in subjects between 50 and 59 years. The seroprevalence of \textit{Chlamydia pneumoniae} in the HIV-I infected intra-

venous drug users was significantly higher \((p < 0.01, \chi^2\) test) than both HIV-I negative intravenous drug users and immunocompetent subjects matched for age and sex (table 1). Four (4%) HIV-I positive intravenous drug users had an IgM titre > 1:16, suggesting acute infection. Children with vertically infected HIV-I had a significantly higher prevalence \((p < 0.05, \chi^2\) test) than healthy controls matched for age and sex (table 2). Two (4%) HIV-I positive children also had an IgM titre > 1:16, suggesting acute infection.

**Discussion**

\textit{Chlamydia pneumoniae} is an emerging respiratory pathogen worldwide, causing more than 10% of community acquired pneumonias with a high seroprevalence in the adult population.\(^3\) Moreover, a possible role for this agent in low respiratory tract infections in immunocompromised patients has been suggested.\(^8\) To our knowledge, no data on seroprevalence in HIV-I infected subjects have been reported in the literature and the epidemiology of \textit{Chlamydia pneumoniae} in Italy is unknown.

We therefore studied \textit{Chlamydia pneumoniae} seroprevalence in a sample of the population of Milan, and in two groups of immunocompromised subjects represented by HIV-I infected drug users and HIV-I vertically infected children.

The microimmunofluorescence serological test used in this study, although quite time consuming, is a specific and sensitive diagnostic method for \textit{Chlamydia pneumoniae} infection. Thom \textit{et al}\(^4\) reported that isolation of \textit{Chlamydia pneumoniae} without serological evidence of acute infection is rare and occurred in only 4/1100 of their patients. Grayston\(^1\) in a large study involving more than 6000 subjects confirmed that non-specific reactions in the microimmunofluorescence test between \textit{Chlamydia trachomatis} and \textit{Chlamydia pneumoniae} do not occur when the test is interpreted properly for specific reactions.

Our data on population seroprevalence in the healthy population are consistent with those reported by Grayston \textit{et al}\(^1\) and show that infection is endemic in the general adult population in our area, with a similar pattern to that in other western countries. \textit{Chlamydia pneumoniae} seroprevalence in HIV-I infected subjects was significantly higher than in healthy subjects for both HIV-I vertically infected

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**Table 1**

Demographic characteristics and serological data in HIV-I positive and HIV-I negative intravenous drug users and in control subjects matched for age and sex

<table>
<thead>
<tr>
<th></th>
<th>HIV-I positive</th>
<th>HIV-I negative</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(96)</td>
<td>(126)</td>
<td>(147)</td>
</tr>
<tr>
<td>M/F</td>
<td>73/23</td>
<td>92/34</td>
<td>95/52</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>29-1</td>
<td>29-6</td>
<td>28-5</td>
</tr>
<tr>
<td>Age range (years)</td>
<td>18-35</td>
<td>18-37</td>
<td>18-34</td>
</tr>
<tr>
<td>IgG &gt; 1:64 *</td>
<td>58 (50%)*</td>
<td>41 (33%)</td>
<td>59 (40%)</td>
</tr>
<tr>
<td>IgM &gt; 1:16</td>
<td>4 (4%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\(\chi^2 < 0.01\) \textit{Chlamydia pneumoniae} seroprevalence in HIV-I positive \& HIV-I negative intravenous drug users \& controls (\(\chi^2\) test).

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**Table 2**

Demographic characteristics and serological data of HIV-I vertically infected children and control subjects matched for age and sex

<table>
<thead>
<tr>
<th></th>
<th>HIV-I positive</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(50)</td>
<td>(87)</td>
</tr>
<tr>
<td>M/F</td>
<td>23/27</td>
<td>42/45</td>
</tr>
<tr>
<td>Age range (months)</td>
<td>8-123</td>
<td>6-120</td>
</tr>
<tr>
<td>IgG &gt; 1:64</td>
<td>13 (26%)*</td>
<td>9 (11%)</td>
</tr>
<tr>
<td>IgM &gt; 1:16</td>
<td>2 (4%)</td>
<td>0</td>
</tr>
</tbody>
</table>

\(\chi^2 < 0.05\) \textit{Chlamydia pneumoniae} seroprevalence in HIV-I positive children \& controls (Fisher’s exact test).
children and HIV-I infected intravenous drug users. Interestingly, in the latter group seroprevalence was also significantly higher when compared with a group of HIV-I negative intravenous drug users, suggesting that the risk factor for Chl pneumoniae infection is immunodeficiency rather than life style.

The high seroprevalence of Chl pneumoniae in HIV-I infected subjects, and the casual finding of antibody titre suggesting acute infection, together with the recent reports of clinical Chl pneumoniae infections in immunocompromised subjects* confirm the potential role for this agent in the pathogenesis of respiratory tract infections in HIV-I infected subjects.

Further studies are needed to elucidate fully the pathogenetic role of Chl pneumoniae in HIV-I infected subjects, because this high antibody prevalence could be the result of either a greater rate of infection in immunocompromised subjects or a polyclonal immunoglobulin activation commonly found in HIV patients.

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