Genital infection by *Chlamydia trachomatis* in Lisbon: prevalence and risk markers

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**Background.** There is little information about the prevalence and risk markers for *Chlamydia trachomatis* infections in Portugal.

**Objectives.** Our aim was to assess the prevalence of *C. trachomatis* genital infection and to study variables associated with this infection in a group of sexually active women aged < 30 years living in the Lisbon area and to estimate the prevalence of *C. trachomatis* infection among partners of infected patients.

**Methods.** A systematic sample of women observed in general practice family planning and teenager clinics was collected. A questionnaire was administered, followed by a pelvic examination. A first-catch urine sample was taken for polymerase chain reaction (PCR) Amplicor assay. When a sample tested positive, the woman was invited to obtain a urine sample from her partner. Socio-demographic, behavioural and clinical variables were studied and their association with the PCR Amplicor result was assessed.

**Results.** A total of 1108 women, aged between 14 and 30 years, were studied. Fifty-one women (4.6% of total sample) tested positive for *C. trachomatis*. The prevalence of infection was slightly higher in patients aged ≤19 years (5.3%) than in age groups 20–25 (4.8%) and 26–30 years (3.9%). African ethnicity was related to a higher percentage of infection than European ethnicity: 9.8% versus 3.8%, *P* = 0.0067. Use of condoms ‘sometimes/never’ was associated with a higher prevalence of infection: 5.2% versus 2.3% in those responding ‘always/almost always’ (*P* = 0.0447). An altered cervix was associated with a higher prevalence of infection: 7.3% versus 3.7% with a normal cervix (*P* = 0.0106). Urine samples were obtained from 16 partners of infected patients. Six partners (37.5%) tested positive for *C. trachomatis*.

**Conclusions.** A 4.6% prevalence of *C. trachomatis* genital infection was found. African ethnicity, using condoms ‘sometimes/never’ and an altered cervix were associated with *C. trachomatis* infection, but showed low positive predictive value for *C. trachomatis* infection. Younger age may be associated with a slight increase in risk. Contact tracing for diagnosis and treatment remains a difficult issue to approach effectively.

**Keywords.** *Chlamydia trachomatis*, contact tracing, epidemiology, polymerase chain reaction, sexual behaviour.

**Introduction**

Genital *Chlamydia trachomatis* infection is an established cause of pelvic inflammatory disease (PID), ectopic pregnancy and infertility among women. Epidemiological studies show this infection to be one of the most widespread sexually transmitted diseases in the world today. Attempts at a clinical diagnosis invariably have been disappointing. Laboratory testing of chlamydial genital infection, on the other hand, continues to improve. There is a growing body of evidence in favour of genital *C. trachomatis* screening; however, doubts remain about whether this screening should be systematic, targeted to specific female populations or opportunistic. The issue of contact tracing remains a relevant problem.

There is little information about the prevalence and risk markers for *C. trachomatis* infection in Portugal.
This study had the following objectives:

(i) to describe a sample of sexually active women, aged 30 or below, observed in family planning or teenager primary care clinics in health centres in the Lisbon area;
(ii) to assess the prevalence of *C. trachomatis* genital infection in that sample;
(iii) to identify possible risk markers associated with the infection; and
(iv) to assess the prevalence of infection in the sexual partners of the women who tested positive for *C. trachomatis* infection.

**Methods**

A systematic sample of women observed in general practice family planning and teenager clinics was studied between April 1999 and February 2000. Inclusion criteria were: (i) age < 30 years; (ii) sexually active; (iii) a pelvic examination being already scheduled; and (iv) informed consent given by the patient. Socio-demographic variables studied were age, educational level, professional status, marital status and ethnic group. Behavioural variables included age of onset of sexual activity; number of sexual partners to date, in the 3 months previous to the study and presently; use of a condom (always, almost always, seldom, never); and use of antibiotics in the previous 30 days. Clinical variables studied were reason for encounter of the current appointment; gynaecological history including number of pregnancies, spontaneous abortions and voluntary terminations; history of PID or infertility; presence and characteristics of vaginal discharge; and presence and characteristics of cervical lesions. After informed consent was obtained, a questionnaire was administered, followed by a pelvic examination. A first-catch urine sample was taken for polymerase chain reaction (PCR) Amplicor assay (RMS™). The samples were delivered by courier to a single laboratory where all tests were performed and were processed in the same day, or stored at 2–8 °C for a maximum of 7 days. The questionnaires were delivered directly to one of the authors (ABS) in order to ensure confidentiality.

Chi-square, Student’s *t*-test and logistic regression were used to check for associations between variables and PCR positivity.

**Results**

A total of 1108 women, aged between 14 and 30 years, were studied. Mean age was 23.4 ± 4.1 years. Most women (40.3%) had finished secondary school, 25.7% had at least a basic education and 22.1% had a university degree. Sixty per cent had a job and 23.0% were students. Single and married/living together status were nearly equally distributed (50.8 and 47.2% of the total sample). Most women were of European ethnicity (85.2%), and 13.0% were of African ethnicity.

Mean age for first sexual intercourse was 17.8 ± 2.4 years. A single sexual partner ever was reported by 52.2% of the respondents, 25.3% reported two partners and 12.8% reported three. Ninety-five per cent reported a single sexual partner in the previous 3 months. Condoms reportedly were used ‘always/almost always’ by 20.0% of women, and ‘sometimes/never’ by 80.0%. Antibiotics had been taken by 12.2% of women in the previous 30 days. Main reasons for encounter were clinical check-ups and/or preventive procedures (55.3%).

Fifty-one women (4.6% of total sample) tested positive for *C. trachomatis*. Table 1 shows data concerning the association of some selected variables with *C. trachomatis* infection. Age, educational level, professional situation, marital status, age of onset of sexual activity, present number of partners and gynaecological history did not show an association with chlamydial infection. Mean total number of sexual partners was higher in the PCR-positive group, but the difference was not statistically significant. The prevalence of infection was just slightly higher in patients aged <19 years (12/226; 5.3%) than in age groups 20–25 (24/499; 4.8%) and 26–30 years (15/382; 3.9%).

African ethnicity was related to a higher percentage of infections than European ethnicity: 14/143 (9.8%) versus 36/940 (3.8%), *P* = 0.0067. Use of condoms

<table>
<thead>
<tr>
<th>Variable</th>
<th>Positive PCR</th>
<th>Negative PCR</th>
<th>95% CI</th>
<th>Statistical significance</th>
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<tbody>
<tr>
<td>Age&lt;sup&gt;a&lt;/sup&gt;</td>
<td>12</td>
<td>214</td>
<td>5.4–18.6</td>
<td>NS</td>
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<tr>
<td>14–19</td>
<td>24</td>
<td>475</td>
<td>14.6–33.4</td>
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<tr>
<td>20–25</td>
<td>15</td>
<td>367</td>
<td>7.6–22.4</td>
<td></td>
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<tr>
<td>Education</td>
<td>36</td>
<td>904</td>
<td>24.5–47.5</td>
<td><em>P</em> = 0.0067</td>
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<tr>
<td>Ethnicity&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14</td>
<td>143</td>
<td>7.0–21.0</td>
<td></td>
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<tr>
<td>European</td>
<td>1</td>
<td>20</td>
<td>–0.9–2.9</td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>26</td>
<td>712</td>
<td>16.2–35.8</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of onset of sexual activity&lt;sup&gt;b&lt;/sup&gt;</td>
<td>18.0 ± 2.5</td>
<td>17.8 ± 2.4</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Total no. of sexual partners&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.3 ± 2.4</td>
<td>1.9 ± 1.6</td>
<td>NS</td>
<td></td>
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<tr>
<td>Use of condom&lt;sup&gt;a&lt;/sup&gt;</td>
<td>46</td>
<td>879</td>
<td>33.0–59.0</td>
<td><em>P</em> = 0.0447</td>
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<td>Sometimes/never</td>
<td>5</td>
<td>219</td>
<td>0.7–9.3</td>
<td></td>
</tr>
<tr>
<td>Always/ almost always</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cervix&lt;sup&gt;a&lt;/sup&gt;</td>
<td>25</td>
<td>345</td>
<td>15.5–34.5</td>
<td><em>P</em> = 0.0106</td>
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<tr>
<td>Altered</td>
<td>26</td>
<td>712</td>
<td>16.2–35.8</td>
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<tr>
<td>Normal</td>
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</tbody>
</table>

<sup>a</sup> Chi-square.<br>
<sup>b</sup> Student’s *t*-test; mean ± SD.
‘sometimes/never’ was associated with a higher prevalence of infection—46/879 (5.2%) versus 5/219 (2.3%) in those responding ‘always/almost always’ ($P = 0.0447$). An altered cervix was associated with a higher prevalence of infection—25/345 (7.3%) versus 26/712 (3.7%) with a normal cervix ($P = 0.0106$). However, logistic regression only identified ethnicity as an independent risk factor for PCR positivity.

Urine samples were obtained from 16 partners of infected patients (31.4% of total positive cases), and six (37.5%) tested positive for *Chlamydia trachomatis*.

**Discussion**

This study was conducted in the primary care setting. Patients studied were those seen in the family planning clinics of health centres on a normal basis. Only patients who had a pelvic examination scheduled for any reason were invited to participate in the study, in order to avoid a possible selection bias. We thus think that the sample obtained, despite its relatively small size, accurately reflects the population reality of primary care family planning clinics in the Lisbon area, run by family doctors. The processing of all urine samples in the same laboratory, using a highly specific and sensitive diagnostic method, also contributed to the validity of the information obtained.

We found a prevalence similar to those described in other Western European cities; the marked increase in prevalence associated with an African origin of the patient has also been found by others. This increased prevalence in the African ethnic group was found to be independent of education, professional status and number of sexual partners.

Age at first intercourse has been found by others to be associated with genital infection by *Chlamydia trachomatis*. An inverse trend relating age and prevalence of infection was in fact found in this study, but no statistically significant association could be found, perhaps due to the small sample size.

Using condoms ‘sometimes/never’ and the presence of an altered cervix, though positively associated with the infection, fail to provide an acceptable positive predictive value for infection: 6.5 and 6.8% positive predictive values, respectively. This indicates that, as mentioned before, a clinical approach is not adequate for our population, leaving the prevalence as the sole epidemiological indicator for a decision for or against any kind of formal screening.

Contact tracing and treatment remain a major problem in our study; asking the women with a positive result for *Chlamydia trachomatis* to obtain a urine sample from their partners for testing elicited a response from fewer than one-third of the women. A high prevalence of infection (almost 40%) was found among partners, reinforcing the notion that active efforts to identify sexual partners of infected women are essential, to reduce both reinfection rates and new infections.

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**References**