Epidemiological study of Chlamydia trachomatis infection in pregnant women in Hungary

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A multicentre survey was carried out in order to determine the prevalence and risk factors of Chlamydia trachomatis infection in the pregnant population in Hungary. The nucleic acid hybridisation method (PACE 2 Gen-Probe) was applied for the examination of C. trachomatis. The overall average prevalence of C. trachomatis cases during an 18 month survey on 6161 pregnant women was 5.87%. There were significant differences in the proportions of chlamydial infection in the different survey centres, and also in the different age groups and the different family status groups. The perinatal mortality rate exhibited a significantly higher prevalence (8.52%) among C. trachomatis positive than among negative patients (2.03%). In the anamnestic histories of C. trachomatis infected patients, the frequency of premature uterine activity was 8.13%, in contrast with 5.18% in the non-infected group (p<0.05). We suggest that all pregnant women be tested for C. trachomatis infection.

Keywords: pregnant women; Chlamydia trachomatis; epidemiology; Hungary

Introduction
Urogenital disease due to chlamydial infection most often occurs as asymptomatic or mild urethritis and cervicitis, but it can also produce serious sequelae, including endometritis and salpingitis in women, resulting in spontaneous abortion, premature delivery, and ectopic pregnancy. Neonates delivered vaginally from infected mothers may contract chlamydial conjunctivitis or pneumonia.1 The number of infections is increasing worldwide from year to year. Since many infected people are asymptomatic, it is difficult to identify those in need of treatment.2,3

Several factors may be involved in the acquisition of Chlamydia trachomatis infections—the roles of age, sex, ethnic and family status, education, the number of sexual partners, etc have been examined with regard to the development of infections.4,5

Only data from small numbers of case studies are available on the prevalence of C. trachomatis infection among Hungarian STD patients, and in most centres there has previously been no screening for C. trachomatis.6 In order to determine the prevalence and some of the risk factors of genital C. trachomatis infections, we have carried a study among pregnant women attending health centres in different regions of Hungary.

Materials and methods
STUDY POPULATION
The study started in January 1994 and terminated in June 1995 in seven different centres—two in Budapest, and one each in Debrecen, Miskolc, Nyíregyháza, Szeged, and Szombathely. The envisaged sample size was around 700 women at each centre. Asymptomatic, HIV negative pregnant women were recruited in a complaint-free condition and also when complaints arose during pregnancy—intrauterine growth retardation (IUGR), premature rupture of membranes (PROM), spontaneous preterm labour, threatening abortion, and premature delivery. The background data relating to social and marital status and age were recorded.

LABORATORY TESTS
The PACE 2 Gen-Probe based on nucleic acid hybridisation was applied in each centre to detect C. trachomatis.

STATISTICAL ANALYSIS
An interviewer administered standardised questionnaire was completed. Data management was carried out with self developed software, and statistical analyses with the spss software package. Comparisons between groups employed $\chi^2$ tests and Student’s t tests. For the examination of trends in the monthly frequencies of infection, we used the moving average and linear regression methods. To obtain an overview of the risk, the data were cross tabulated in several ways and multiple logistic regression analysis was performed to differentiate between subgroups with various degrees of high risk.7 Results are presented as percentages, means, and odds ratios with 95% confidence intervals. A probability level of p<0.05 was considered statistically significant.

Results
A total of 6161 pregnant women were examined for the presence of C. trachomatis. The overall average C. trachomatis infection rate was 5.87%. The monthly relative frequencies of C. trachomatis exhibited linear growth (R=0.937) (Fig 1). A significantly higher C. trachomatis infection rate was identified in the Miskolc region (9.88%), where the highest rate of unemployment has occurred in Hungary in the past few years (table 1). The difference between the ages of the C. trachomatis infected...
patients (24.48 (SD 7.37) years) and the non-
infected women (26.27 (6.89) years) was
statistically significant (p<0.01).

Certain potential risk factors of the infection were examined. As shown in table 1, a young
age, unmarried status, and no previous
pregnancies were statistically significant
predictors of the infection. Furthermore, the
age group under 20 years displayed a very high
rate of infection (11.41%). Both univariate and
multivariate analysis indicated that the taking
of antibiotics during pregnancy (to treat
different from C trachomatis, upper
or lower respiratory tract infections) did not
significantly influence the risk of infection.

The association of symptoms and signs of
pathological pregnancy with the probability of
chlamydial infection was also examined. In the
anamnestic history of C trachomatis
infected patients, the frequency of premature uterine
activity was 8.13%, in contrast with 5.18% in
the non-infected group. This difference was
significant (p<0.05). There were no significant
differences between C trachomatis infected and
non-infected women with regard to PROM,
IUGR, and low birth weight.

The perinatal mortality exhibited a signifi-
cantly higher (p<0.05) prevalence (8.52%)
among C trachomatis positive than among
negative patients (2.03%). A significantly
higher number of babies of C trachomatis
positive mothers (17.14%) were treated in neonatal
intensive care units (NICU) compared with
negative ones (6.32%). Congenital pneumonia
was identified in 7.14% of the newborns of
chlamydia infected women. IUGR occurred in
7.32% and 5.75% of the C trachomatis
positive and negative cases, respectively.

Discussion
Numerous surveys have been carried out to
study the prevalence of urogenital C trachomatis
infections. The results of these studies reflect
various frequencies in the different countries.
Humphreys found that the rate of C trachoma-
tis infection in women in the state of Colorado
was 7.7% (n=11793), whereas Ryan et al
reported a rate of 21.8% (n=11544). In the
present study, examinations were carried out on
6161 pregnant women. The overall rate of
C trachomatis infections was 5.87%. Because of
the increasing trend in the monthly frequencies
of positive cases, we consider that the true
prevalence of chlamydial infection is higher. In
oursurvey, the age group under 20 years exhib-
ted a very high risk of infection. The prevalence of
chlamydial infection was significantly higher
in the less developed areas of Hungary, where
the unemployment rate is higher than in the
western region. Significant differences between
married and unmarried women were found in the
Hungarian population examined with re-
gard to C trachomatis infection.

There was a significant correlation between the
C trachomatis infection rate and premature
uterine activity. Close correlations between the

Table 1 Risk factors for Chlamydia trachomatis infections among 6161 pregnant women. Odds ratios and p values from multivariate logistic regression analysis. An odds ratio of 1.0 indicates the reference category. Data missing in up to 74 women

<table>
<thead>
<tr>
<th></th>
<th>No C trachomatis positive</th>
<th>% Infection</th>
<th>Odds ratio (95% CB)*</th>
<th>Probability level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre</td>
<td></td>
<td></td>
<td></td>
<td>p&lt;0.01</td>
</tr>
<tr>
<td>Budapest I</td>
<td>188</td>
<td>15</td>
<td>7.97</td>
<td>2.01 (1.29–3.11)</td>
</tr>
<tr>
<td>Budapest II</td>
<td>683</td>
<td>20</td>
<td>2.92</td>
<td>0.94 (0.66–1.34)</td>
</tr>
<tr>
<td>Debrecen</td>
<td>471</td>
<td>6</td>
<td>1.27</td>
<td>0.49 (0.23–1.03)</td>
</tr>
<tr>
<td>Miskolc</td>
<td>2114</td>
<td>209</td>
<td>9.88</td>
<td>3.01 (2.11–4.47)</td>
</tr>
<tr>
<td>Nyíregyháza</td>
<td>1416</td>
<td>76</td>
<td>5.36</td>
<td>1.19 (1.05–1.36)</td>
</tr>
<tr>
<td>Szombathely</td>
<td>292</td>
<td>4</td>
<td>1.36</td>
<td>0.49 (0.19–1.24)</td>
</tr>
<tr>
<td>Szeged</td>
<td>997</td>
<td>32</td>
<td>3.21</td>
<td>1.0</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>&lt;20</td>
<td>743</td>
<td>85</td>
<td>11.41</td>
<td>1.59 (1.34–1.88)</td>
</tr>
<tr>
<td>20–28</td>
<td>3243</td>
<td>176</td>
<td>5.42</td>
<td>0.97 (0.89–1.07)</td>
</tr>
<tr>
<td>&gt;29</td>
<td>2175</td>
<td>101</td>
<td>4.64</td>
<td>1.0</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Unmarried</td>
<td>1055</td>
<td>89</td>
<td>8.43</td>
<td>1.43 (1.16–1.75)</td>
</tr>
<tr>
<td>Married</td>
<td>5032</td>
<td>273</td>
<td>5.42</td>
<td>1.0</td>
</tr>
<tr>
<td>Previous pregnancies</td>
<td></td>
<td></td>
<td></td>
<td>p&lt;0.01</td>
</tr>
<tr>
<td>Primigravida</td>
<td>2515</td>
<td>178</td>
<td>7.07</td>
<td>1.38 (1.13–1.68)</td>
</tr>
<tr>
<td>Multigravida</td>
<td>3625</td>
<td>773</td>
<td>5.07</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*95% CB = 95% confidence bounds.
C. trachomatis infection rate and PROM have been described in the literature. The data from our study did not support this. Perinatal mortality as one of the most important features of perinatal care was significantly higher among C. trachomatis positive patients. A significantly higher number of newborns of C. trachomatis positive women were treated in NICU compared with negative ones. The babies were generally transferred to the NICU because of congenital pneumonia. The 7.14% prevalence of congenital pneumonia among the babies of chlamydia infected mothers was less than that found by Smith and Taylor-Robinson. Our examinations did not reveal a significant connection between IUGR, low birth weight, and C. trachomatis positive cases; this result is similar to that reported by Germain et al.

The financial limitations did not allow control of the sexual partners of the infected women. In every case of detected C. trachomatis infection, we suggested the control and possible antibiotic treatment of the partner. Since the majority of the C. trachomatis infected cases were asymptomatic, we suggest the testing of all pregnant women, but we would emphasise the great importance of the screening of unmarried women under 20 years of age before induced abortion, and also screening of the unmarried pregnant population before delivery. Our results have led to screening for chlamydial infections being introduced in all 20 public health centres in Hungary.

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