Is an Antenatal Screening for *Chlamydia trachomatis* Necessary in the Current Society?

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Abstract: A screening of *Chlamydia trachomatis* infection in young pregnant women (≤25 years old) and their newborns was conducted. A total of 136 women were tested with urine samples in the immediate postpartum period. The prevalence was 18.4% (95% confidence interval [CI]: 11.9–24.9%) (25/136) and the rate of perinatal transmission was 35% (7/20). These results support the need for antenatal screening programs in high-risk women in Madrid (Spain).

Key Words: *Chlamydia trachomatis*, antenatal screening, perinatal transmission.

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Chlamydia trachomatis (CT) is the most frequently reported sexually transmitted infection (STI) worldwide. *C. trachomatis* infections in women are usually asymptomatic (70%–80% of all cases).[1] Consequently, undetected and untreated infections can progress to other conditions such as pelvic inflammatory disease, infertility, ectopic pregnancy and chronic pelvic pain. Well recognized risk factors are young age, low socio-economic class, immigration, single marital status and promiscuity.

C. trachomatis infection during pregnancy may additionally influence obstetrical outcomes leading to premature rupture of membranes, prematurity, low birth weight and perinatal mortality.[2] The most common clinical manifestations of perinatally acquired *C. trachomatis* in the newborn are conjunctivitis and lower respiratory tract infection.[3]

In most countries, the prevalence of *C. trachomatis* infection in pregnant women is not well characterized, which is essential to design appropriate infection control programs. *C. trachomatis* screening in young and/or pregnant women has not been generally implemented in Spain, but it is actively followed by other countries, based on the recommendations of Centers for Disease Control and Prevention and US Preventive Services Task Force.[4,5]

We aim to analyze the prevalence of *C. trachomatis* infection in pregnant young women in a reference hospital in Madrid, Spain, and the rate of perinatal transmission to evaluate the need for *C. trachomatis* screening programs for our population.

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MATERIALS AND METHODS

A prospective study was conducted at the University Hospital La Paz (Madrid, Spain), between November 2018 and June 2019, with women between 15 and 25 years old, who delivered a live neonate. The study was approved by the Local Ethics Committee for Clinical Research (approval number: HULP PI-3435; Issuing date 6-Nov-2018) and informed consent was signed. The women included in the study were informed about *C. trachomatis* infection and were screened in the immediate postpartum period.

The presence of *C. trachomatis* was investigated in urine samples. *C. trachomatis* DNA was detected using a real-time polymerase chain reaction (PCR multiplex BDmax) for STI: *C. trachomatis*, *Neisseria gonorrhoeae* and *Trichomonas vaginalis*. *C. trachomatis* positive women were referred to a gynecologist for treatment (azithromycin 1 g single dose, orally), as well as their sexual partners, when applicable. The treatment given to *T. vaginalis* and *N. gonorrhoeae* positive women were metronidazole 2 g and ceftriaxone 250 mg IM single dose, respectively. Similarly, their newborns were placed under medical examination and microbiological surveillance (PCR in nasopharyngeal aspirate [NPA] and urine samples) within the period of 1–2 weeks after birth. Mothers were asked about possible *C. trachomatis* related symptoms during the first days of the neonate's life. Additionally, a telephone number was provided to the mothers to contact us in case of new onset of conjunctival or respiratory symptoms during the first year of the newborn's life.

When *C. trachomatis* was detected in any clinical sample from a neonate born to a *C.trachomatis*-positive woman, vertical transmission was considered. Positive infants were treated with azithromycin 20 mg/kg/day orally for 3 days. One month after treatment, we collected samples again from the babies to check if they were negative.

Qualitative data were expressed by absolute frequencies and percentages meanwhile quantitative data were expressed by median and interquartile range. The associations between all variables and *C. trachomatis* infection were analyzed by χ^2 test or Fisher test for qualitative/categorical variables and U-ManWhitnney test for quantitative/continuous variables. All statistical tests were considered bilateral and a P value of <0.05 was considered statistically significant. Data were analyzed with SAS 9.3 (SAS Institute, Cary, North Carolina, USA).

RESULTS

During the study period, 218 women less or equal to 25 years of age gave birth in our hospital. A total of 136 parturient women (median age 22 years, IQR 20–24) and 136 newborns were included in the study. The clinical characteristics of the cohort are shown in Table 1. Most women were from Latin America (83/136; 61%) and Europe (46/136; 33.8%). European women were mostly of Spanish descent (38/46; 82.6%). The prevalence of *C. trachomatis* infection

TABLE 1. Comparison Between *C. Trachomatis* Positive and Negative Parturient Women

	Total Sample (n = 136)	*C. trachomatis* Positive (n = 25)	*C. trachomatis* Negative (n = 111)	*P* Value
Age group				0.01*
15–20 years	42 (30.9%)	12 (28.6%)	30 (71.4%)	
21–25 years	94 (69.1%)	13 (13.8%)	81 (86.2%)	
Ethnicity				0.26*
Latin American	83 (61%)	18 (21.7%)	65 (78.3%)	0.64*
European	46 (33.8%)	7 (15.2%)	39 (84.8%)	
Asian	5 (3.7%)	0	5 (100%)	
African	2 (1.5%)	0	2 (100%)	
N. gonorrhoeae test				0.22*
Positive	4 (3%)	1 (25%)	3 (75%)	
Negative	132 (97%)	24 (18.2%)	108 (81.8%)	
T. *vaginalis* test				0.56*
Positive	5 (3.7%)	2 (40%)	3 (60%)	
Negative	131 (96.3%)	23 (17.6%)	108 (82.4%)	
Gestacional age				0.639*
<37 weeks	8 (5.9%)	2 (25%)	6 (75%)	
>37 weeks	128 (94.1%)	23 (18%)	105 (82%)	
Birthweigth				0.258*
<Percentile 10	13 (9.6%)	4 (30.8%)	9 (69.2%)	
>Percentile 10	123 (90.4%)	21 (17%)	102 (83%)	

*Fisher test.

was higher in women from Latin America, but this difference did not reach statistical significance.

In our study, 8/136 (6%) of newborns were preterm (<37 gestation weeks) and 4/136 (3%) post-term (>41 gestation weeks). None of the newborns were extremely premature (<28 gestation weeks). The median birth weight was 3207.5 g (IQR 2900–3502.5).

C. trachomatis was detected in 25/136 women (18.4%; 95% confidence interval (CI): 11.9%–24.9%). *N. gonorrhoeae* was detected in four urine samples (3%) and *T. vaginalis* in five (3.6%). None of the women referred any symptoms related to infection. Three women presented with co-infections (two women with *C. trachomatis* and *T. vaginalis* and one woman with *C. trachomatis* and *N. gonorrhoeae*). Median age of positive *C. trachomatis* women was 20 years (IQR 18–23) versus 22 years (IQR 20–24) in negative *C. trachomatis* women ($P = 0.01$).

The rate of perinatal transmission was 35% (7/20). However, five infants from infected mothers were lost to follow-up. The positive *C.trachomatis* samples of the babies were five NPA, two urine and one conjunctival. One child had both urine and NPA positive PCR. Four children developed mild respiratory symptoms (coughing and respiratory secretions), two children had conjunctivitis during their second week of life and one child was asymptomatic. None of them were preterm and all were treated. All children were negative 1 month after receiving treatment and none of the women contacted us to refer new symptoms.

We analyzed associations between *C. trachomatis* infection and preterm birth, low birth weight percentile and premature rupture of membranes. However, we did not find statistically significant differences.

DISCUSSION

This study describes a 18.4% prevalence of *C. trachomatis* infection in young pregnant women examined at a tertiary care hospital in Madrid (Spain). A vertical transmission rate of 35% was observed. This is the first study to investigate the prevalence of *C. trachomatis* infection in our region, and its findings could support the need for antenatal screening.

This prevalence is significantly higher than other European countries ranging between 3% and 9%.[6,7] In Spain, Fernández-Benítez et al[8] found a 4% prevalence among 1,048 young women (15–24 years old). In Asturias, Piñeiro et al [9] found a 6% prevalence among 596 women younger than 25 years old in Gipuzkoa, meanwhile the overall age-adjusted prevalence was 1%, that could be related to a decrease in the number of sexual partners as the women grew older. Our study is limited by a wide CI, however, Madrid and its region has a high proportion of immigrant women, especially from Latin America, that could explain the differences with other areas.[10] Higher infection rates are described in their countries of origin, as Pinto et al published a *C. trachomatis* prevalence rate of 9.8% in Brazil.[1] Early childbearing and different sexual behaviors could explain these findings.

We additionally tested the women for both *N. gonorrhoeae* and *T. vaginalis.* We detected a prevalence of 2.9% for *N. gonorrhoeae* infections and 3.6% for *T. vaginalis.* The prevalence of *N. gonorrhoeae* detection in pregnant women has been estimated to range from 0.08% to 7.9% in different settings. Few data are available about *T. vaginalis* prevalence as it is not a notifiable disease, but it is around 3% in sexually active women.[11]

The risk of *C. trachomatis* perinatal transmission has been found to be as high as 36% considering the positive cultures from these children,[12] the scientific literature is however limited. In Spain, Piñeiro et al [10] estimated a *C.trachomatis* vertical transmission rate of 10.7% considering a prevalence of 1% in overall ages, which is far away from our results (35%). The higher perinatal transmission rate observed in our study could be associated with the method of collecting respiratory samples (nasopharyngeal aspirate versus pharyngeal exudate) and the inclusion of urine samples, that could have improved *C. trachomatis* detection. Additionally, we examined the vertical transmission based on women ranging between 15 and 25 years old, which supports the need to screen this high-risk group of women.

The main limitation of our study is the small simple size and the loss of follow-up. Microbiological analysis was not performed in five children born to positive-*C. trachomatis* women because we lost contact with their mothers. We considered this problem secondary to the women's young age, lack of awareness of illness and being members of a social risk group. Our findings cannot be

generalized, but could be used as a warning of a possible health issue for pregnant women and their newborns. Vertical transmission can be avoided with screening programs as part of antenatal care for this target population (women ≤25 years old or those with risk factors), that could be ideally performed in the first and third trimester of gestation. We are currently implementing this practice in our routine gestational care.

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