ARTICULO ORIGINAL – ORIGINAL ARTICLE

Chlamydia trachomatis infection among asymptomatic pregnant women attending an antenatal clinic in Piura, northern Peru

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Abstract
A cross-sectional descriptive study was conducted among asymptomatic pregnant women attending an antenatal clinic in Piura, northern Peru. Structured questionnaires were used to collect demographic and behavioral information, and clinical and gynecologic examinations were performed to detect clinical signs of infection. Cervical swabs were collected to detect the infection due to *C. trachomatis* using the direct immunofluorescence technique.
C. trachomatis infection was detected in 11 (22%) of the 50 asymptomatic pregnant women. Multiple logistic regression analysis indicated that history of previous abortions (OR = 7.73) and history of previous sexually transmitted infections (STI) (OR = 4.45) were significant independent risk factors for chlamydial infection (P<0.05).
A substantial prevalence of *C. trachomatis* infection in this asymptomatic pregnant women population was found in the study area. These results support a strategy of screening pregnant women for bacterial STIs (followed by treatment of infections), which could be integrated into routine pregnancy care in northern Peru.

Key Words: *Chlamydia trachomatis*, asymptomatic, pregnancy, women, Latin America, Peru.
(Source: DeCS Bireme)

Infection à *Chlamydia trachomatis* chez des femmes enceintes asymptomatiques dans le service pre-natal d'une clinique à Piura, au nord du Pérou

Résumé
Une étude descriptive transversale a été menée chez des femmes enceintes asymptomatiques dans le service pre-natal d'une clinique à Piura, au nord du Pérou. Des questionnaires structurés ont été employés pour collecter des informations démographiques et comportementales; des examens cliniques et gynécologiques ont été faites pour détecter les signes cliniques de l'infection. Des frottis cervicales ont été rassemblées pour détecter l'infection due au *C. trachomatis* en utilisant la technique d'immunofluorescence directe.
L'infection à *C. trachomatis* a été détectée dans 11 (22%) des 50 femmes enceintes asymptomatiques. L'analyse de régression logistique multiple a indiqué que des antécédents d'avortements précédents (OR = 7.73) et des infections transmises sexuellement (ITS) précédentes (OR = 4.45) étaient des facteurs de risque indépendants significatifs pour l'infection chlamydiale (P<0.05).

Une prédominance substantielle de l'infection de *C. trachomatis* dans cette population asymptomatique de femmes enceintes a été retrouvée dans la région étudiée. Ces résultats soutiennent une stratégie de criblage chez les femmes enceintes pour ITS bactérien (suivi du traitement des infections), qui pourrait être intégré dans les soins courants de grossesse au nord du Pérou.

Key Words: risk factors, cardiovascular diseases, BMI, lipid profile.
(source: DeCS Bireme)

Introduction

Chlamydia trachomatis has currently emerged as one of the most common sexually transmitted pathogens (10). Chlamydial infection produces less severe symptoms than other sexually transmitted infections (STI), and sometimes could be completely asymptomatic (2, 10, 11). These deceptively mild symptoms allow the infection to go unnoticed with minimal patient awareness until secondary or tertiary symptoms develop (10). Few reports from developing countries show the prevalence in pregnant women ranging from 5-45% (13, 18, 22). Given these aspects screening of women in antenatal care is highly recommended (9).

Detection of *C. trachomatis* infection by non-culture techniques became feasible with the recent development of immunological reagents specific for this organism. The direct immunofluorescence (DIF) staining is one of such tests (9).

In this study we evaluated the cross-sectional prevalence of *C. trachomatis* infection among asymptomatic pregnant women attending an antenatal clinic in Piura, Northern Peru, where no previous have been done.

Methods

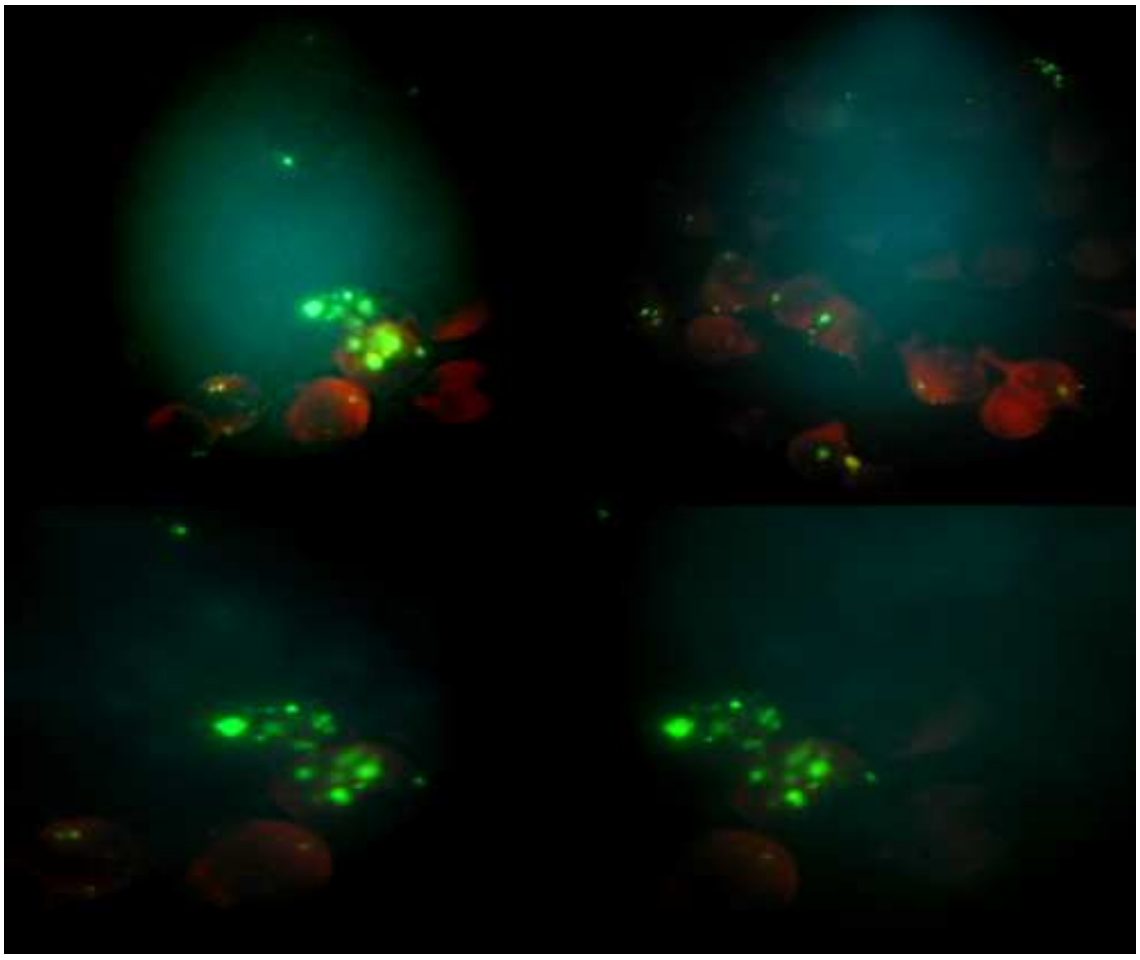
This cross-sectional observational study was conducted during the month of February 2007 in the antenatal clinic of the Santa Rosa Hospital, Piura, Northern Peru, where 32,834 women live, with an approximately 50% of coverage for the antenatal care program, attending approximately 193 women per month. Based on an estimated prevalence of *C. trachomatis* infection of 34.8% obtained from an study among pregnant women attending antenatal clinic in Lima, the capital city of Peru (15), a sample size of at least 48 women would allow a reasonable estimate of *C. trachomatis* infection prevalence in our study (95% confidence level, α=1.96, β=-0.84). Fifty pregnant women attending the antenatal clinic during their first prenatal visit to this clinic were invited to participate in the study. Those who agreed to participate in the study gave their informed consent and were enrolled. After informed consent was obtained, a questionnaire was administered to each woman by a trained physician through an interview in a separate counseling room in the clinic. The questionnaire covered demographic and behavioral information including age, age at first sexual relation, years of sexual life, gestational age, education level, marital status, number of sexual life partners, history of STIs, history of abortions, history of premature membrane rupture (PMR), and history of preterm births (PTB). This study was approved by the medical ethics committees of the Universidad Nacional de Piura, Peru.

Each woman also underwent a clinical and gynecologic examination by gynecologic doctors to identify any genital ulcers, genital warts, and vaginal or

cervical discharge. Cervical swabs were collected to test for *C. trachomatis* using the direct immunofluorescence kit (Kallestad Diagnostics) according to the manufacturer's instructions (Figure 1). The sample was prepared into fluorescence slide glasses. After being dried in air, the samples were fixed with cold methanol for 5 min. Twenty-five microliters *C. trachomatis* monoclonal antibody was dropped on these slides, which were incubated at 37oC for 30 min in a dark and humidified conditions. After washing with PBS for 1 min, mounting substance including glycerol was dripped. The preparation was examined using an immunofluorescence microscope.

All data from questionnaires, clinical and gynecologic examinations, and laboratory tests were entered into a computer database. Prevalence of infection with *C. trachomatis* with 95% confidence intervals (CIs) was measured. Odds ratios (ORs) for risk factors for acquiring the infections were also determined. Data analysis was conducted using the Statistical Package for Social Sciences for Windows (version 10.0; SPSS Inc., IL, USA) and GraphPad Prism (version 4.0; GraphPad Software, Inc., NC, USA). $P < 0.05$ was considered statistically significant.

Figure 1. Positive cervical swabs tested for *C. trachomatis* using the direct immunofluorescence kit.



Results

The mean age of the 50 asymptomatic pregnant women enrolled in this study was 26.9±5.62 y-old, they had a mean gestational age of 26.12±8.79 weeks. The mean age at first sexual relation was 19.56±3.83 y-old, with a mean sexual life years of 7.34±4.98. The mean number of approved scholar years was 10.78±3.69. About marital status 86% was married. The number of sexual life partners was just one in 62%. History of STIs was reported in 36%, history of abortions in 36%, history of premature membrane rupture 12%, and history of preterm births in 6%.

From the total, 11 (22%, 95%CI 12.15-35.01%) were diagnosed by DIF with *C. trachomatis* infection. Among the *C. trachomatis* infected group mean age was 25.64±5.89 y-old compared with those not infected of 27.26±5.57 y-old (Student's *t*=0.816; *P*=0.427; Mann-Whitney *U*=185.00; Wilcoxon W=251.00; Z=-0.693; *P*=0.488) and the mean age at first sexual relation in those infected was 18.55±3.96 y-old compared with 19.85±3.8 for those not infected (Student's *t*=0.917; *P*=0.346; Mann-Whitney *U*=170.00; Wilcoxon W=236.00; Z=-1.051; *P*=0.293). The prevalence of chlamydial infection was higher in those younger than 20 y-old (60.0% vs 17.8%, OR=6.94, p=0.064) (Table I). Although we did not find significant differences between mean age and age at first sexual relation and age and age at first sexual distribution we observed that the women who initiated younger their sexual relations in the study were those infected (Minimum possible Wald-Wolfowitz Z=-3.43; *P*<0.001) (Figure 2). Except for the history of STIs (39% vs 13%, respectively, OR=4.45, *P*=0.041) and history of abortions (44% vs 9%, respectively, OR=7.73, *P*=0.009), we did not observed other significant differences between those infected or not (*P*>0.05) (Table I).

Figure 2. Age and Age at First Sexual Relation of the asymptomatic pregnant women evaluated in Piura, Peru, February 2007. (DIF = direct immunofluorescence)

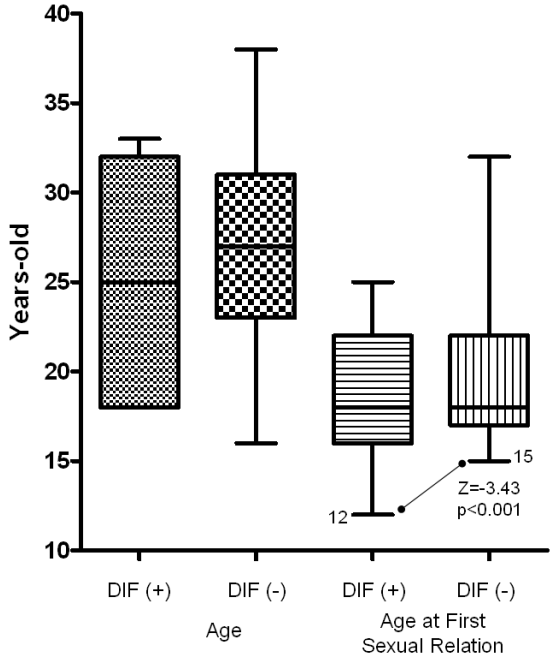


Table I. Prevalence of Chlamydial Infection by Demographics, Sexual Behavior, and STI and Obstetrical History (Univariate Analysis).

Factor	Category	Prevalence, % (95% CI)	Odds ratio (95% CI)
Demographics			
Age	<20 y-old	60.0 (18.23-92.65)	6.94 (0.75-74.15)*
	≥20 y-old	17.8 (8.61-30.98)	1
Educational Level	≤10 years	14.3 (2.47-39.73)	0.50 (0.06-3.14)
	>10 years	25.0 (12.94-40.94)	1
Marital status	Married	23.3 (12.46-37.55)	1.82 (0.17-44.93)
	Unmarried	14.3 (0.71-53.02)	1
Gestational age			
Trimester	I	25.0 (1.25-75.77)	1.20 (0.01-15.88)
	II and III	21.74 (11.60-35.33)	1
Sexual behavior			
Age at first sex	<20 y-old	23.3 (10.82-40.79)	1.22 (0.26-6.04)
	≥20 y-old	20.0 (6.69-41.49)	1
Sexual life years	>5 years	25.9 (12.11-44.67)	1.66 (0.35-8.22)
	≤ 5 years	17.4 (5.78-36.80)	1
History of			
STI	Yes	38.9 (18.86-62.26)	4.45 (1.18-23.30)†
	No	12.5 (4.10-27.45)	1
Abortion	Yes	44.4 (23.21-67.34)	7.73 (1.43-46.86)‡
	No	9.4 (2.44-23.43)	1
PMR	Yes	33.3 (6.02-73.81)	1.94 (0.21-15.95)
	No	20.5 (10.46-34.22)	1
PTB	Yes	66.7 (12.21-98.33)	8.44 (0.51-267.29)
	No	19.1 (9.76-32.23)	1

CI = confidence interval; STI = sexually transmitted infection; PMR = premature membrane rupture; PTB = history of preterm births. *P=0.064. †P=0.041. ‡P=0.009.

Discussion

The results of this study provide data that can be used to develop a chlamydial infection prevention and control strategy among pregnant women in northern Peru, serving as a baseline study about this problem in this region where no other locations or populations have been studied previously.

We found a prevalence of 22% in this suburban setting of Piura, which is comparable to that observed among women in the capital city survey in Lima, made in 1997-1998 (34.8%) (15). But in our case, in the evaluated population in the current study the rates of infection were higher in younger population (60% in <20 y-old) compared to the Lima study (33% in <23 y-old). Despite the limitations of sample size of this study, these preliminary results imply a significant prevalence, young age for infection and early sexual relation activity in this suburban population. Our study population was completely asymptomatic, whilst in the Lima study 19.5% presented symptoms.

Numerous surveys have been carried out in other countries to study the prevalence of *C. trachomatis* infection among pregnant women or women attending antenatal clinics (1, 3, 21). Our prevalence is comparable to those found in several other countries: 24% in Turkey (6), 21.1% in United Kingdom (7), 20.8% in Norway (20), and 20% in Netherlands (17). In the Latin American region, most previous studies in other countries have found lower prevalences, e.g. 10% in asymptomatic pregnant women from Mexico (5), 3.5% in symptomatic pregnant women from Argentina (4), 2.1% in symptomatic pregnant women from Brazil (19); just in El Salvador was higher, 44% (16).

Our study, being based in a single suburban practice, could only recruit a small number of patients. Nevertheless our findings should alert suburban and rural doctors to the high prevalence and importance of this STI, and to the practicability of undertaking a practice-based screening approach to early detection and treatment, as has been made in other similar epidemiological settings, to avoid and reduced its consequences (2).

Chlamydia trachomatis infection is associated with previous abortions, in our study we observed in 44% of those infected a history of abortion, a previous study in India report this figure as 28% (9), but a recent study using PCR to detect *C. trachomatis* in aborted tissues found an association of 32% (8).

There is increasing evidence that *C. trachomatis* infection may result in a number of adverse pregnancy outcomes, including early and late abortion (as we seen herein as the association between the infection and history of it), intrauterine infections of the fetus, stillbirth, prematurity, premature rupture of the membranes and postpartum endometritis (11).

Our findings suggest a high prevalence of *C. trachomatis* and probably of other STIs and a large proportion of asymptomatic infections among pregnant women in an antenatal clinic in northern Peru. The results suggest that screening for bacterial STIs (followed by treatment of infections) would be an effective strategy for enhancing efforts to control STIs among pregnant women and to prevent adverse pregnancy outcomes. Such a strategy could be integrated into routine pregnancy care in all northern region of Peru. However, studies on the feasibility and acceptability, as well as the cost-effectiveness, of this strategy are

needed to further validate the strategy before our findings can be translated into local, regional or even national policies (14).

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