Original Articles

The prevalence of *Chlamydia trachomatis* in young women

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ABSTRACT

Background. *Chlamydia trachomatis* infection is common in women with pelvic inflammatory disease, infertility and ectopic gestation. In this study we examined the prevalence of this infection in young women undergoing routine gynaecological checks.

Methods. Three hundred and five women aged between 19 and 41 were included in our study. Endocervical smears were collected by speculum examination, air-dried, acetone-fixed and stained for chlamydial antigen using fluorescein-labelled monoclonal antibody.

Results. Ninety-five per cent of the women were asymptomatic. Only 5% had mild symptoms such as white discharge, abdominal pain or profuse periods; 34% gave a history of white discharge only. Chlamydial antigen was detected in cervical smears from 47 (15%) women. Of these, 9 (19%) had symptoms at examination and 20 (43%) had symptoms within 2 months. On gynaecological examination 25 women (53%) had minor signs such as erosion or cervicitis and only 1 (2%) had uterine tenderness suggestive of mild pelvic inflammatory disease.

Conclusions. It is important to diagnose chlamydial infection early because in its later stages it is associated with an ascending infection and serious complications. Young, relatively asymptomatic women should be screened for the presence of this organism.

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INTRODUCTION

Chlamydia trachomatis (*C. trachomatis*), an intracellular obligate organism, is one of the commonest causes of sexually transmitted disease.[1–3] It is a major cause of cervicitis, pelvic inflammatory disease (PID), tubal infertility and ectopic pregnancy. Infection in pregnancy can cause neonatal chorioamnionitis, prematurity, conjunctivitis and pneumonia. It has also been implicated in repeated abortions and cervical dysplasia in women, urethritis, polyarthritis and proctitis in both sexes, and epididymitis and prostatitis in men. There are at least 15 serological types of *C. trachomatis* out of which types D, E and F are commonly associated with genital infections, PID and infertility. Three new types have been identified recently. Earlier reports from developed countries indicated prevalence rates up to 35% in women in sexually transmitted diseases (STD) clinics and up to 10% in university students or women attending antenatal clinics. Recent studies have shown that this infection is also common in developing countries in Africa.[2–4] Prevalence rates of up to 30% have been reported in STD clinics or in other high-risk women and up to 15% in low-risk women. In India prevalence rates of up to 45% have been reported in women with PID or infertility.[5,6] It is well known that infection with *C. trachomatis* remains silent or produces minimal symptoms in many women but can become chronic.[1–4] It may, therefore, remain undetected unless special diagnostic tests are used. Antibody-detecting techniques using ELISA are available but can detect only past infection. However, with the development of antigen-detecting methods using ELISA or fluorescein-tagged antibody, it has become possible to detect active infection. The aim of this study was to determine the prevalence of *C. trachomatis* antigen in cervical secretions from women undergoing routine gynaecological checks.

SUBJECTS AND METHODS

Women aged 19 to 41 years attending the peripheral clinics of this Institute between October 1992 and February 1993 were included in the study and their symptoms and signs were recorded. All of them were fertile and had come for a routine gynaecological examination. Cervical smears were collected by introducing a sterile Ayre's spatula into the endocervical canal for 10 seconds and rotating it. The smear was spread on a glass slide and air-dried. It was fixed with acetone and preserved at −20 °C. Staining for chlamydial antigen was carried out by adding fluorescein isothiocyanate (FITC) labelled monoclonal antibody (Wellcome Diagnostics) in a moist chamber and using positive and negative controls. The overall sensitivity of this method is 86% and the specificity is 99%. Smears were screened under a fluorescent microscope using an FITC filter system, at a maximum excitation wavelength of 490 nm and a mean emission wavelength of 520 nm. These were considered to be positive for *C. trachomatis* if 5 or more bright apple-green fluorescent disc-shaped elementary bodies (EBs) with a diameter of 250–300 nm were seen in the smear (Figs. 1 and 2). Epithelial cells were stained with orange or red-coloured fluorescence. Most positive smears contained more than 10 EBs as well as larger fluorescent bodies due to a conglomeration of EBs.

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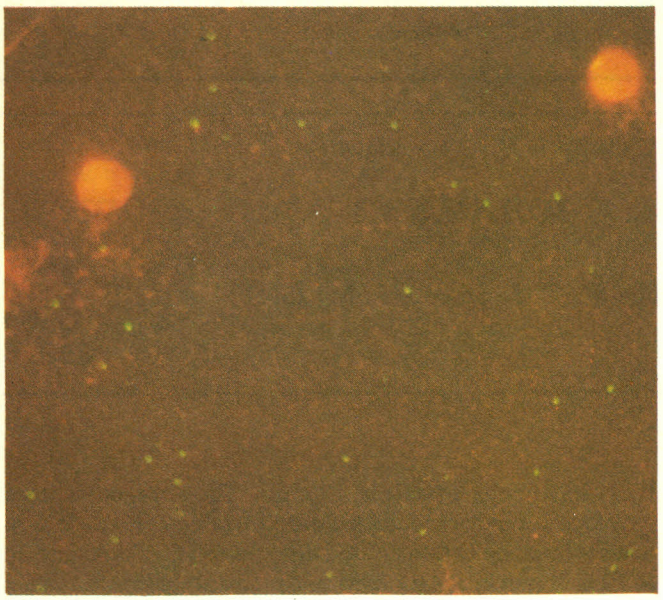

FIG 1. Positive control for *C. trachomatis* stained with fluorescein isothiocyanate showing apple-green fluorescent elementary bodies (×450)

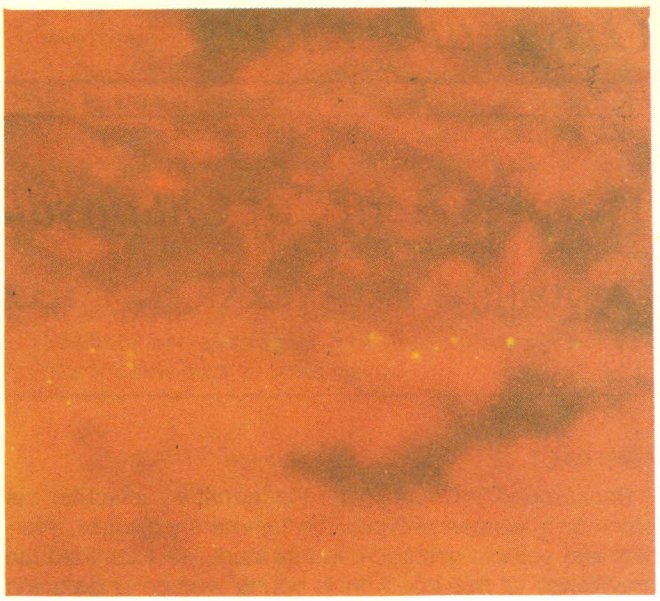

FIG 2. Cervical smear positive for *C. trachomatis* stained with fluorescein isothiocyanate (×450)

Intracellular as well as extracellular EBs were observed. Although larger fluorescent reticulate bodies were seen intracellularly, only if typical small disc-like EBs were present could a diagnosis of chlamydial infection be made.

RESULTS

Cervical smears from 305 women were examined. The majority of whom (259; 85%) were below the age of 36 years. Only 5% presented with symptoms of genital tract infection such as pain in the lower abdomen, white discharge, pruritus, dysmenorrhoea, dyspareunia or profuse periods whereas 34% gave a history of a white discharge only. Using the FITC stain, *C. trachomatis* antigen was present in smears from 47 (15%) women. Out of these, 9 had mild symptoms and none had severe symptoms such as fever or severe abdominal pain. Only 1 woman had uterine tenderness suggestive of mild PID while 25 showed signs of mild local infection such as cervical erosions, cervicitis or mucopurulent discharge. None had parametrial tenderness, tubo-ovarian masses or peritonitis. More women presented with pre- or post-menstrual discharge, dyspareunia and profuse periods when seen two months after this examination (Table I). These symptoms were more common in women who were positive for *C. trachomatis* ($p<0.02$). Eighty-one per cent of the women positive for *C. trachomatis* were asymptomatic at the time of routine examination and 47% had not experienced any symptoms in the previous 2 months. Out of the total symptomatic group at examination ($n=16$) or within 2 months ($n=54$), only 9 were positive for *C. trachomatis*. Out of 91 cases who showed signs on examination, only 26% were positive for the antigen. The only case of mild PID was in the chlamydia-positive group.

All women participating in this study were married. They all reported only 1 sexual partner, except 2 who admitted to having 2 sexual partners and they were found to be negative for chlamydial antigen by the immunofluorescence test. The mean age, parity and years of sexual activity in the chlamydia-positive and chlamydia-negative groups were not significantly different (Table II).

TABLE I. Symptoms and signs in women with cervical smears tested for *C. trachomatis* antigen*

Symptoms and signs	Total ($n=305$)	Immunofluorescence		p value
		Positive ($n=47$)	Negative ($n=258$)	
Symptomatic at examination	16 (5)	9 (19)	7 (3)	<0.02
Symptomatic within 2 months	54 (18)	20 (43)	34 (14)	<0.02
Signs on examination	91 (30)	26 (55)	65 (25)	<0.02
Mild pelvic inflammatory disease	1 (0.3)	1 (2)	0 (0)	<0.02
None	188 (62)	21 (45)	167 (65)	<0.02

* Vertical columns do not add up to 100% because criteria were not mutually exclusive Symptoms included leucorrhoea, dysmenorrhoea, pain in lower abdomen, dyspareunia and dysuria Signs included cervicitis, erosion, tenderness of uterus or fornices and induration Figures in parentheses indicate %

TABLE II. Parity and sexual activity in women with cervical smears tested for *C. trachomatis* antigen

Item	Chlamydia-positive	Chlamydia-negative
Mean age in years	28.2 (5.6)	29.4 (6.2)
Mean parity	1.7 (0.7)	1.7 (0.6)
Mean years of sexual activity	7.1 (5.3)	8.6 (6.8)

Figures in parentheses indicate the standard deviation

DISCUSSION

We observed a prevalence rate of 15% for *C. trachomatis* in relatively asymptomatic young women. Our earlier study on changes in Papanicolaou smears in women undergoing routine gynaecological checks indicated that cytological changes suggestive of *C. trachomatis* infection were present in 9% of the women.[7] Another study at our Institute in high-risk women (commercial sex workers) from central Bombay indicated a prevalence of 9.7% using cytology and 23% using an FITC antigen detecting kit.[8] Thus the Papanicolaou smear does not provide a specific diagnosis.[9] Other studies in India have reported positivity rates of 15% to 60% in young women with infertility or PID and for those attending STD clinics.[5,6,10]

The methods commonly used to diagnose *C. trachomatis* are cytology, ELISA, FITC and culture. Pandit *et al.*[11] have reported a 2.6% prevalence rate using Giemsa's stain for cervical smears. However, this method is not sensitive for the detection of *C. trachomatis* and is not recommended by the World Health Organization.[12] Even culture may not be sensitive enough if proper precautions are not taken.[13] FITC staining, on the other hand, is highly sensitive and specific.[9,12–14]

The results show that although the clinical features related to genital infections were significantly more common in women with smears positive for *C. trachomatis* antigen, the positivity rate in those with symptoms and signs did not exceed 37%. Thus the symptoms and signs in chlamydia-negative cases could have been caused by other reproductive tract infections or hormonal changes. Screening for *C. trachomatis* should not be based on the clinical features but on the age, reproductive status and the presence of other risk factors.

Correlation with other STDs is not reported in this study because it is very difficult to distinguish these diseases in relatively asymptomatic women merely on the basis of their symptoms. However, a study has been initiated which includes investigations with immunofluorescence for the herpes simplex virus and serological tests for syphilis, the hepatitis B and the human immunodeficiency virus (HIV).

There were no significant differences in the age, parity, number of years of sexual activity and number of sexual partners in women positive or negative for *C. trachomatis* in the present study. This was expected because this study was not directed towards young adolescents and all the women were married.

Using the sensitive FITC technique the present study has demonstrated that chlamydial antigen is frequently present in cervical smears of young women, the majority of whom are asymptomatic. The exact percentage of women with chlamydial cervicitis who will develop an ascending infection of the pelvic organs is not known but is estimated to be about 10%.[4,15] These women are, therefore, at risk of more serious consequences of PID. Additionally, if they conceive, they can transmit the infection to the newborn. *C. trachomatis* has also been identified as a co-factor which increases the risk of transmission of HIV.[16,17] The HIV-seropositivity rate for a high-risk group in areas around Bombay has been reported to be 60%[18] although lower rates also occur.[19] It is thus of importance that prevention of this infection is emphasized by advocating safe sex and the use of mechanical and chemical barrier methods.[20,21] Early diagnosis and complete treatment of both partners is equally important for preventing ascending infection and other complications.

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REFERENCES

1 Pearlman MD, McNeeley SG. A review of the microbiology, immunology, and clinical implications of *Chlamydia trachomatis* infections. *Obstet Gynecol Surv* 1992;**47:**448–61.
2 Faro S. *Chlamydia trachomatis*: Female pelvic infection. *Am J Obstet Gynecol* 1991;**164:**1767–70.
3 World Health Organization. Sixth Report of the Expert Committee on Venereal Diseases and Treponematosis. *WHO Tech Rep Ser* 1986;**736:**9–40.
4 Germain A, Holmes KK, Piot P, Wasserheit JN (eds). *Reproductive tract infections: Global impact and priorities for women's reproductive health*. International Women's Health Coalition (IWHC). New York:Plenum Press, 1992.
5 Arora M, Malhotra S, Sharma M. Role of *Chlamydia trachomatis* in pelvic inflammatory disease. *Indian J Med Res* 1992;**95:**41–2.
6 Lal H, Rathee S, Sharma D, Chaudhary S. Detection of *Chlamydia trachomatis* antigen by enzyme immunoassay in patients with pelvic inflammatory disease. *Indian J Med Res* 1992;**95:**77–8.
7 Joshi JV, Mali BN, Hazari KT, Chitlange SM, Shah RS. Abnormal cytology indicating sexually transmitted diseases in women attending family welfare clinics. *J Obstet Gynaecol India* 1991;**41:**521–4.
8 Mali BN. Cytological diagnosis of sexually transmitted diseases and their association with cervical intraepithelial neoplasia. Bombay:University of Bombay, 1991 [PhD Thesis].
9 Kiviat NB, Peterson M, Kinney-Thomas E, Tam M, Stamm WE, Holmes KK, *et al.* Cytologic manifestations of cervical and vaginal infections. II. Confirmation of *Chlamydia trachomatis* infection by direct immunofluorescence using monoclonal antibodies. *JAMA* 1985;**253:**997–1000.
10 Mittal A, Kapur S, Gupta S. Screening for genital chlamydial infection in symptomatic women. *Indian J Med Res* 1993;**98:**119–23.
11 Pandit DV, Bhatt RR, Karnad JM, Deodhar LP. Microbial screening of females with vaginitis. *J Obstet Gynecol India* 1993;**43:**244–56.
12 World Health Organization. Report of the Expert Committee on Venereal Diseases and Treponematoses. *WHO Tech Rep Ser* 1986;**736:**64–5.
13 Lin JL, Jones WE, Van L, *et al.* Underdiagnosis of *Chlamydia trachomatis* infection. *Sex Trans Diseas* 1992;**19:**259–65.
14 Tam MR, Stamm WE, Handsfield HH, Stephens R, Kuo CC, Holmes KK, *et al.* Culture-independent diagnosis of *Chlamydia trachomatis* using monoclonal antibodies. *N Engl J Med* 1984;**310:**1146–50.
15 Paavonen J, Kiviat N. Brunham RC, Stevens CE, Kuo CC, Stamm WE, *et al.* Prevalence and manifestations of endometritis among women with cervicitis. *Am J Obstet Gynecol* 1985;**152:**280–6.
16 Nzila N, Laga M, Thiam MA, Mayimone K, Edidi B, Van-Dyck E, *et al.* HIV and other sexually transmitted diseases among female prostitutes in Kinshasa. *AIDS* 1991;**5:**715–21.
17 Joshi JV, Mali BN, Bhave GG, Wagle U. Cervical neoplasia and cytological manifestations of sexually transmitted diseases in HIV seropositive prostitutes. *Cytopathology* 1993;**4:**63–4.
18 Grez M, Dietrich U, Maniar J, Goerdt S, Rupsamen-Waigmann H, Pfutzner A. High prevalence of HIV-1 and HIV-2 mixed infections in India. *Proceedings of the IX International Conference on AIDS in Affiliation with IV STD World Congress, Berlin, 6–11 June 1993* (Abstract 0177).
19 Kamat HA, Banker DD. Human immunodeficiency virus-1 infection among patients with sexually transmitted diseases in Bombay. *Natl Med J India* 1993;**6:**11–13.
20 Harrison HR, Costin M, Meder JB, Bownds LM, Sim DA, Lewis M, *et al.* Cervical *Chlamydia trachomatis* infection in university women—Relationship to history, contraception, ectopy and cervicitis. *Am J Obstet Gynecol* 1985; **153:**244–51.
21 Niruthisard S, Roddy RE, Chutivongse S. Use of nonoxynol-9 and reduction in rate of gonococcal and chlamydial cervical infections. *Lancet* 1992;**339:** 1371–5.