BACTERIAL STI

Prevalence of *Chlamydia trachomatis* infections among women from different settings in China: implications for STD surveillance

X-S Chen, Y-P Yin, D Mabey, R W Peeling, H Zhou, W-H Jiang, W-H Wei, G Yong, M-Q Shi, Q Chen, X Gao

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The organism *Chlamydia trachomatis* is an important sexually transmitted pathogen. Besides causing urethritis and cervicitis, it is known that this infection, if undiagnosed and untreated, may result in serious secondary complications and sequelae, increase the risk of HIV transmission and acquisition,[1–3] and may be a co-factor in the development of cervical cancer.[4] The National STD Surveillance System was established in 1987 to monitor the sexually transmitted disease (STD) epidemic in China through STD case notification nationwide and prevalence surveys in a limited sentinel sites. In China, chlamydial infection was not reported as a separate notifiable STD until 2006.[5] Laboratory based prevalence surveys have been gradually introduced into surveillance activities of chlamydial infections in China, and women at high risk—that is, female sex workers (FSWs), have been considered as one of key groups in such surveys. However, in implementation of these surveys, the settings where such high risk women are recruited vary widely from survey to survey. In order to explore possible differences in the prevalence of chlamydial infection between different settings, we measured the prevalence of chlamydial infection among women from the different settings.

The study population consisted of 1497 women, including 839 consecutive clients from STD clinics in five cities (Chengdu, Fuzhou, Nanjing, Shanghai, and Shenzhen), 587 women from female re-education centres (FRECs) (that is, female sex workers) in four cities (Chengdu, Fuzhou, Guangzhou, and Shenzhen), and 71 women from sex entertainment venues (SEVs) in one city (Shenzhen). After informed consent was obtained participants were interviewed according to a structured questionnaire. Cervical specimens were evaluated for *Chlamydia trachomatis* with Roche Amplicor PCR assay, as recommended by the manufacturer's instructions.

A total of 1415 women (STD clinic, 798; FREC, 547; and SEV, 70) were included for analysis. The median age was 29 years, 28 years, and 24 years for women from STD clinics, FRECs, and SEVs, respectively. The difference in age was statistically significant between settings ($p<0.01$, Mann-Whitney test). A substantial proportion of subjects, 64.9% (324/499) from FRECs, 72.7% (579/796) from STD clinics, and 98.6% (69/70) from SEVs, admitted that they were at risk of sexually transmitted infections (STIs). Two hundred and fourteen (26.9%) women attending STD clinics reported the primary reason for their clinic visit was because they suspected that their sex partners may have STIs. The overall prevalence of *C trachomatis* infection varies by setting. The frequency of positive tests among women from STDs (OR = 0.47; $p<0.01$) or FRECs (OR = 0.35; $p<0.001$) was statistically significantly lower than that observed in women recruited from SEVs (table 1). The percentage of women who reported having had multiple sex partners was higher among women recruited from either FRECs (58.1%; OR = 13.5; $p<0.001$) or SEVs (91.4%; OR = 104.1; $p<0.001$) compared with those from STDs.

A substantial prevalence of *C trachomatis* was found among women in all three settings. However, the prevalence varies significantly by setting, showing a higher prevalence among women in SEVs than STD clinics or FRECs. This may be because in many areas sex workers arrested by police are examined for STIs through symptomatic evaluation or simple laboratory tests, and treated if positive before they are sent to and detained at the re-education centres. Moreover, poorer sex workers or those engaging in the specific SEVs are more likely to be arrested by police and taken to FRECs, resulting in an over-representation of female sex workers of low socioeconomic and education status.[6] For STD patients, the nature of sexual behaviours among this population may be different from those in FRECs or SEVs, and some patients (one fourth in the present study) come to clinics for screening to exclude STIs because they suspect their sex partners to have STIs.

Commercial sex is illegal in China. Risk behaviours and sociodemographic characteristics linked to the sex trade may be associated with care seeking behaviours[7 8] and/or social stigma. For example, women at higher risk may be less likely to seek care at public STD sectors, resulting in a poor representation and significant selection bias. Information bias is another concern in the re-education centres or the clinics. The significant difference in terms of demographic characteristics and positivity for *C trachomatis* between women recruited from SEVs and those from STD clinics and FRECs warrants consideration of what kind of population we should recruit or/and where we should recruit them to represent the groups at high risk of *C trachomatis* infection and other STIs for surveillance purposes. However, the interpretation of epidemiological and behavioural data, emerging from such settings, with a significant selection bias is challenging. High prevalence of the infections in the study populations further emphasise the importance of the effective curative and preventive STI services to high risk women.

Surveillance of *C trachomatis* infection and other STIs, as well as monitoring success of the response to STI epidemic may be improved by carefully considering and selecting appropriate target populations to represent women at high risk.

Abbreviations: FRECs, female re-education centres; FSWs, female sex workers; SEVs, sex entertainment venues; STD, sexually transmitted diseases; STI, sexually transmitted infections

Table 1 Demographic and behavioural characteristics and prevalence of chlamydial infection among female subjects recruits from different setting by study area

Characteristic by study area	Settings where subjects were recruited*			Difference among settings (p value)
	STDC (n = 798)	FREC (n = 547)	SEV (n = 70)	
Age (years)				
Median (IR)	29 (24 to 35)	28 (23 to 33)	24 (21 to 27)	<0.001
Marital status				
% married	73.9	41.7	32.9	<0.001
Odds ratio (95% CI)	5.77 (3.42 to 9.74)	1.46 (0.86 to 2.48)	1.00	
Risk behaviour				
% of subjects who admitted to have multiple sex partner	9.3	58.1	91.4	<0.001
Odds ratio (95% CI)	0.01 (0.00 to 0.02)	0.13 (0.06 to 0.31)	1.00	
Chlamydial infection				
% prevalence (95% CI)	14.0 (11.8 to 16.6)	10.8 (8.5 to 13.7)	25.7 (16.9 to 37.1)	<0.001
Odds ratio	0.47 (0.27 to 0.84)	0.35 (0.19 to 0.64)	1.00	

STDC, STD clinic; FREC, female re-education centre; SEV, sex entertainment venue; IR, interquartile range; 95% CI, 95% confidence interval.

Key messages

- There is a substantial prevalence of *Chlamydia trachomatis* infections among female sex workers
- There is a diversity on prevalence of *C trachomatis* among women at high risk recruited from different settings

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CONTRIBUTORS

XSC and YPY were principal investigators who were responsible for the study design, data analysis, and manuscript preparation. DM and RWP were responsible for revision of manuscript in addition to study design. HZ, WHJ, and GY were collaborators in study sites. WHW, QC, and XG were responsible for field coordination and data management. MQS was the laboratory based senior technician who was responsible for the laboratory testing.

Authors' affiliations

X-S Chen, Y-P Yin, W-H Jiang, W-H Wei, M-Q Shi, Q Chen, X Gao, National Center for STD Control, Chinese Academy of Medical Sciences and Peking Union Medical College Institute of Dermatology, Nanjing, China
D Mabey, London School of Hygiene and Tropical Medicine, London, UK
R W Peeling, World Health Organization, Geneva, Switzerland
H Zhou, Shenzhen Institute of Dermatology, Shenzhen, China
G Yong, Sichuan Institute of Dermatology and Venereology, Chengdu, China

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Correspondence to: Dr Xiang-Sheng Chen, National Center for STD Control, 12 Jiangwangmiao Street, Nanjing 210042, China; chenxs@vip.163.com

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