

Prevalence of *Chlamydia trachomatis* in Singaporean Women Undergoing Termination of Pregnancy

D Gopalakrishnakone,¹MBBS, DP Appan,² Kuldip Singh,³MMed (O & G), MRCOG, MD

Abstract

Introduction: The primary objective is to determine the prevalence of *Chlamydia trachomatis* infection among 200 women seeking termination of pregnancy (TOP) at National University Hospital (NUH), Singapore. The secondary objective is to determine the existence of high-risk sexual behaviours/practices among these women. **Materials and Methods:** Two endocervical swabs were taken from these women; one was transported in Chlamydia transport medium at 2°C to 8°C, while the other was transported in a dry swab at room temperature and analysed with ligase chain reaction/enzyme immunoassay. Demographic data was collected with regard to relevant risk factors in a standard questionnaire. **Results:** 8% (16/200) of the women were found to be positive for *Chlamydia trachomatis* infection. Both the wet and dry methods of transport were equally effective in detection. 16.2% of the women in ≤ 25 years old group were positive versus 3.1% in the ≥ 25 years old group ($P < 0.001$). 75% of the Chlamydia positive women had no symptoms/signs of Sexually Transmitted Infection (STI) or Pelvic Inflammatory Disease (PID). Of the 16 positive women, 14 (87.5%) did not use any contraception. All 12 women below 25 years of age did not use any contraception. **Conclusion:** Prevalence of infertility causing *Chlamydia trachomatis* infection in women is related to age. Thus the recommendation is the opportunistic screening of sexually active women less than 25 years of age.

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Key words: Age, *Chlamydia trachomatis* infection, no barrier contraception

Introduction

Chlamydia trachomatis is the most common bacterially sexually transmitted infection (STI) in England and Wales.¹ This infection if untreated can lead to pelvic inflammatory disease (PID), infertility and ectopic pregnancy.² In fact pelvic inflammatory disease after a termination of pregnancy (TOP) is a well recognised complication and *Chlamydia trachomatis* is a commonly implicated pathogen in such cases.³

One in 4 pregnancies in Singapore are terminated each year. There is also an increasing trend of younger females presenting at gynaecology clinics requesting a TOP.⁴

In view of the large number of women undergoing TOP and the potential risk of developing pelvic inflammatory disease secondary to untreated *Chlamydia trachomatis* infection, this study was undertaken with a primary objective to detect the prevalence of *Chlamydia trachomatis* infection

among women undergoing a TOP in Singapore. Our secondary objective was also to collect socio-demographic data, analyse and identify the existence of high-risk sexual behaviour and contraception usage among these women seeking TOP.

Materials and Methods

Two hundred consecutive women requesting a TOP at the Gynaecology Clinic of the NUH Singapore between July and December 2006 were recruited. Approval was obtained from the Investigational Review Board and Ethical Committee of the NUH, Singapore. Written informed consent was obtained from these women.

Prospective screening was performed to assess the prevalence of *Chlamydia trachomatis* among these women. Specimens were collected from these women prior to elective TOP. Two endocervical swabs were collected from each woman after removal of the exocervical mucus

¹ Department of Obstetrics and Gynaecology, National University Hospital, Singapore

² Elective Medical Student, The University of Melbourne, Australia

³ Department of Obstetrics and Gynaecology, National University Hospital, Singapore

Address for Correspondence: Professor Kuldip Singh, Department of Obstetrics and Gynaecology, National University Hospital, 5 Lower Kent Ridge Road, Singapore 119074.

Email: obgkuldi@nus.edu.sg

and vaginal contaminants that may inhibit the PCR. One swab was transported in 2 SP Chlamydia transport medium at 2°C to 8°C while the other swab was transported dry at room temperature. All specimens reached the laboratory within 24 hours and were analysed using ligase chain reaction/enzyme immunoassay. *Chlamydia trachomatis* antigen is identified by EIA (Chlamydiazyme diagnostic kit, Abbott Laboratories, Abbott Park, Illinois).

Social-demographic data were also collected from these women with regards to their age, marital status, parity, reason for termination, gestation at termination, number of previous terminations of pregnancy as well as usage of reliable contraception. In addition, history of previous pelvic inflammatory disease or sexually transmitted infections was obtained. Symptoms and signs of foul smelling yellowish-green vaginal discharge, abdominal-pelvic pain and fever suggestive of pelvic inflammatory disease were also obtained.

The data were entered onto a standard questionnaire and then coded into a central database. Analysis was performed using SPSS version 14. Chi-square test was used to compare the prevalence of Chlamydia infection between the different age groups. Logistic regression with a positive test for *Chlamydia trachomatis* as the dependent variable was used to identify variables which might be associated with an increased or decreased risk of *Chlamydia trachomatis* infection. The Odds Ratio (95% confidence interval) associated with these variables was also calculated. Variables that appeared significant when entered into a logistic regression made singly, were then entered into a multiple logistic regression model to give adjusted odds ratios.

Results

Prevalence

Eight percent (16/200) of the total women were found to be positive for *Chlamydia trachomatis* infection. It was noted that both the dry and wet swabs transport methods had the same pick up rate for *Chlamydia trachomatis*. There was 100% concordance in PCR results for both positive and negative cases and this indicated that the dry and wet swabs methods were deemed equally effective.⁵ Of the 74 women in the ≤25 years old group, 12 (16.2%) were positive for *Chlamydia trachomatis* compared to 4 (3.2%) in the >25 years group (Table 1). The incidence of Chlamydia infection was higher in the ≤25 years old group and univariate analysis showed that this was statistically significant ($P < 0.001$).

Marital Status and Age

Twenty-six per cent (52/200) of the women in the study were unmarried, of which 96.1% (50/52) were less than 25

years old. Of the 16 women who were Chlamydia positive, 8 (50%) were married women.

History of Pelvic Inflammatory Disease

Seventy-five per cent (12/16) of the *Chlamydia* positive women did not have any symptoms of STI or PID. In the remaining 4 women, 2 had non-investigated pelvic pain that was unrelated to their menses and another 2 had non-investigated yellowish-green vaginal discharge. All these 4 women were above 25 years of age. None of the 200 women in the study were diagnosed or treated for STI or PID previously.

History of Previous Termination of Pregnancy

Thirty per cent (60/200) of the women in the study had a previous TOP (9% had 2 or more, while 21% had only 1 previous termination); 70% (42/60) of those with previous terminations were in the >25 years old group; 50% (30/60) of the women who were coming for a repeat termination, were still not using any reliable contraception and the majority of these 86.7% (26/30) were above 25 years of age (Table 2). None of the women who tested positive for *Chlamydia trachomatis* infection had a previous TOP.

Contraceptive Usage

Fifty-four per cent (108/200) of the study population did not use any form of contraception (Table 3). In the above 25 years old group, 55.6% (70/126) did not use any contraception, 33.3% use the condom as a barrier contraceptive only and only 11.1% used the intrauterine contraceptive device or oral combined pills as a non-barrier form of reliable contraception. In the 25 years and below group, 51.4% did not use any contraception, 35.1% used

Table 1. Chlamydia Positivity Among Women in Study

Age group(y)	Chlamydia negative No.	Chlamydia positive No. (%)
≤25	62	12 (16.2)
>25	122	4 (3.2)

Table 2. Number of Previous Termination of Pregnancy (TOP) and Current Contraceptive Usage Stratified According to Age Groups

Age group (y)	1 previous TOP No.	2 or more previous TOP No.	Previous TOP and still not on contraception No. (%)
≤25	18	0	4 (22.2)
>25	24	18	26 (61.9)
Total (n)	42	18	30 (50.0)

Table 3. Contraceptive Usage Stratified According to Age Groups

Age group (y)	No. Contraception % (No.)	Barrier (Condom) % (No.)	Intrauterine Device or Combined Pill % (No.)
≤25	51.4 (38/74)	35.1 (26/74)	13.5 (10/74)
>25	55.6 (70/126)	33.1 (42/126)	11.1 (14/126)

Table 5. Total Number of Chlamydia Notifications Per 100,000 Females in Singapore

Year of notification	Age group (y)		
	15-24	25-49	15-49
2001	34.8	13.8	19.3
2002	43.8	16.2	23.3
2003	77.6	27.4	40.2
2004	132.3	50.1	71.2
2005	124.4	46.5	66.5

Source: Ministry of Health (Singapore) Annual Report 2005

the condom while 13.5% used the intrauterine contraceptive device and the oral contraceptive pill. Despite the small numbers, the prevalence in the use of different types of contraception between the 2 age groups was similar and was not statistically significant.

Of the 16 women who were positive for *Chlamydia*, only 2 (12.5%) were using the oral contraceptive pill while the remaining 14 (87.5%) were not on any form of contraception. All the 12 women below 25 years old did not use any form of contraception.

Discussion

The 8% prevalence rate of *Chlamydia trachomatis* infection among our study population is similar to the 6% to 8% prevalence rates among women requesting a TOP in the United Kingdom.^{6,7} A study conducted in Singapore among sub-fertile women showed a prevalence rate of 8%.⁸

Our study has also shown that 16.2% (12/74) of the women ≤25 years old had *Chlamydia trachomatis* infection. All 12 were actually asymptomatic and had no symptoms of vaginal discharge, abdomino-pelvic pain or fever to suspect STI or PID. This is higher than the 14% prevalence found in an earlier study carried out in Singapore among a small group of 50 unmarried women seeking a TOP where the ages of the women ranged from 15 to 28 years with a mean of 21.5 years. However no information was collected in this study with regards to the previous history of STI or PID.⁹ In the only other local study among sub-fertile women, all the 100 women were asymptomatic with no

Table 4. Total Number of STI Notifications Per 100,000 Females in Singapore

Year of notification	Age group (y)		
	15-24	25-49	15-49
2001	188.8	89.8	115.7
2002	201.7	105.3	130.0
2003	334.7	131.2	182.9
2004	452.4	194.2	260.4
2005	463.6	199.8	267.4

Source: Ministry of Health (Singapore) Annual Report 2005

previous history of STD or PID as also found in our study.⁸ Furthermore it was seen that the use of barrier contraception among the study population was low. Of the 16 women positive for *Chlamydia*, none had used the condom as a form of barrier contraception.

Statistics from the Ministry of Health, Singapore reveal a dramatic increase over the last 5 years of STIs and *Chlamydia* (Tables 4 and 5). The highest rise was noted among women aged 15 to 24 years old with the number with *Chlamydia* increasing from 34.8 per 100,000 women in 2001 to 124.4 per 100,000 in 2005.¹⁰ One in 4 pregnancies is also being terminated each year in Singapore, with a noted increase of unwanted pregnancies among teenagers.⁴ These increasing epidemiology trends is probably related to the more liberal attitude towards sex among the younger population in Singapore. As a result, more are becoming sexually active at a younger age and are partaking in risky unprotected sexual practices with casual partners constituting the main primary contact.

Local data in Singapore supports the need for more extensive screening among women in Singapore for sterility causing *Chlamydia trachomatis* with a view for earlier detection, treatment and prevention. The results of this study would support the London Department of Health's recommendation of opportunistic screening of all women ≤25 years old and those >25 years old with risk factors¹¹ and would seem justifiable in the local Singapore context too. Cost-effectiveness analyses of opportunistic screening of women attending healthcare clinics or specific high risk groups have been shown to be cost effective at prevalence between 2% to 8%.¹²⁻¹⁵

Based on this pilot study, the authors recommend embarking on a large-scale study to obtain a detailed distribution of key sexually transmitted diseases among the at risk population of ≤25 years old. For the present, we advocate the implementation of opportunities for screening of sexually active women below 25 years of age. The need for better public education and awareness in advising the usage of barrier protection as a means of preventing the spread of STIs cannot be overemphasised.

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