

## Seroprevalence of *Chlamydia trachomatis* Infection in Cervical Cancer Screening Clinic Attendees

Lynn Pa Pa Aye<sup>1\*</sup>, Htwe Htwe Nyunt<sup>1</sup>, Kay Khine Soe<sup>1</sup>,  
Mu Mu Shwe<sup>1</sup>, San Mya<sup>2</sup>, Mon Mon<sup>3</sup>, Wah Win Htike<sup>3</sup> & Win Maw Tun<sup>1</sup>

<sup>1</sup> Department of Medical Research

<sup>2</sup> National Health Laboratory

<sup>3</sup> University of Medicine (1), Yangon

*Chlamydia trachomatis* infection is one of the most common curable sexually transmitted bacterial infections. Nature of the infection is asymptomatic in some cases. Timely diagnosis followed by proper treatment can prevent long term reproductive sequelae. This study was conducted to determine the prevalence of *Chlamydia trachomatis* infection in Cervical Cancer Screening Clinic attendees at Department of Medical Research during 2016-2017. After obtaining informed consent, blood was taken from the participants. The *Chlamydia trachomatis* IgM and IgG were determined in sera by qualitative ELISA. Among 347 participants, 6.3% (22/347) was positive for IgM and 20.2% (70/347) was positive for IgG. Almost all of them (96.7%) were married and their education status is relatively high. More than half of study population 59.4% (206/347) revealed about the Sexually Transmitted Infection (STI) symptoms such as vaginal discharge, pruritus, dysuria, lower abdominal pain and frequent urination. *Chlamydia trachomatis* IgM was positive in 6.3% (13/206) of women with STI symptoms and 6.4% (9/141) of asymptomatic women. *Chlamydia trachomatis* IgG was positive in 19.4% (40/206) of women with STI symptoms and 21.3% (30/141) of asymptomatic women. This study highlighted the rate of *Chlamydia trachomatis* infection in both symptomatic as well as asymptomatic women attending Clinic. The screening of Chlamydia infection in both symptomatic and asymptomatic women is beneficial and especially women presenting with STI symptoms should be screened to assure early diagnosis and timely treatment. Infection screening in antenatal, fertility and STI clinics and medical checkup sessions are advantageous to estimate the infection burden and beneficial for early diagnosis and timely treatment for the individuals.

**Keywords:** Seroprevalence, *Chlamydia trachomatis*, IgM, IgG

### INTRODUCTION

Sexually transmitted infections (STIs) are among the most common diseases and the burden on the health care system and healthcare expenditure is great. Due to their high prevalence, particularly in developing countries, STIs result in significant productivity losses for individuals and communities, mostly where the majority of the population is less than 40 years of age.

And STIs are responsible for an enormous burden of morbidity and mortality in many developing countries because of the effects on reproductive and child health; and also their role in facilitating the transmission of HIV infection. The STIs, often silent and without symptoms, can result in serious or fatal health consequences.<sup>1</sup> Among these,

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\*To whom correspondence should be addressed.

Tel: +95-95041473

E-mail: dr.lynnpapaaye@gmail.com

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*Chlamydia trachomatis* infection is the most common bacterial STI in the world, with the annual detection of estimated 131 million new cases worldwide. The estimated global prevalence of chlamydia was 4.2%. Estimates of the global prevalence and incidence of chlamydia, gonorrhoea, trichomoniasis, and Syphilis in adult women and men remain high, with nearly one million new infections with curable STI each day.<sup>2</sup>

Infection by *C. trachomatis* is insidious because symptoms are absent in many infected individuals. Asymptomatic carriers of *C. trachomatis* contribute to the widespread prevalence and are at risk for developing both acute disease and long-term sequelae. Among them women carry the major burden of the disease and they are at the greatest risk of infection and inflammatory sequelae.<sup>3-5</sup>

Although *C. trachomatis* infection can be effectively treated with antibiotics, untreated infection can result in serious complications such as PID, infertility and ectopic pregnancy in women. The asymptomatic nature of chlamydial infection makes screening essential if control of this infection is to be achieved.<sup>6</sup> Screening is vital in order to reduce propagation and serious complications of the infection.<sup>3, 7</sup> Chlamydial serology, though generally considered to be of little use as a diagnostic tool in individual patients, has been shown to play an important part in defining the epidemiology of chlamydial infection. Sero-epidemiological surveys have helped to define the prevalence of asymptomatic chlamydial infection. IgG and IgM antibodies to *C. trachomatis* can be detected within two to weeks after exposure.<sup>8</sup>

This study mainly focused on the positivity of IgM and IgG antibodies to *C. trachomatis* in women who came to the Cervical Cancer Screening Clinic of Department of Medical Research. Laboratory investigation for this infection is not routinely done in Myanmar. So, this study may contribute some part of epidemiological data for Chlamydial infection and also give an idea that screening is the effective way to detect asymptomatic infection.

## MATERIALS AND METHODS

A cross-sectional descriptive study was carried out on a total of 347 women who came to cervical cancer screening clinic (DMR), Yangon, Myanmar during 2016-2017. The study procedure began after proper explanation about the study and getting the signed informed consent. Relevant sociodemographic and clinical data were collected according to Proforma by interviewing the participant in the separate room where the participant can have privacy. Two milliliters of blood were collected from the participants with aseptic procedure. Blood samples were allowed to clot and then centrifuged for 10 minutes at 2000 rpm for serum separation. The sera were separated and kept at -20°C in deep freezer after proper labeling till performing the ELISA. *Chlamydia trachomatis* IgM and IgG antibodies were detected in the sera by qualitative ELISA kits (Demeditec Diagnostics GmbH, Germany). The data were checked for completeness, errors and inconsistencies prior to the data entry. After data cleaning and data compilation, data entry, processing and analysis were done by using Microsoft Office Excel version 2007.

### *Ethical consideration*

This study was approved by Institutional Review Board (IRB), Department of Medical Research, Yangon (ERC No-011716, Approval No-Ethics/ DMR/ 2016/141).

## RESULTS

A seroprevalence study for *Chlamydia trachomatis* infection was conducted among three hundred and forty-seven women who came to the clinic for cervical cancer screening. According to *Chlamydia trachomatis* IgM, IgG qualitative ELISA, 6.3% (22/347) of women were found positive for IgM and 20.2% (70/347) positive for IgG in this study group.

The youngest age was 18 years, and the oldest was 67 years. The mean age of the study population was 40.6±9.02 years.

The median age was 41 years. According to different age groups, seropositivity of *Chlamydia trachomatis* IgM was found in 14.3% (4/28) and IgG in 14.3% (4/28) among 20-29 years age group. Among 30-39 years age group, IgM was positive in 9.0% (11/122) and IgG in 19.7% (24/122). Seropositivity of *Chlamydia trachomatis* IgM was found in 16.7% (1/6) and IgG in 16.7% (1/6) among women aged 60 years and above. Among them, 60 years and above age group has small sample size and its high positive rate is not statistically significant ( $X^2=8.99$ ,  $p=0.06$ ) (Table 1).

Table 1. Seropositivity of *Chlamydia trachomatis* IgM, IgG in different age groups

Age (years)	Number of participants	IgM positive (%)	IgG positive (%)
<20	3	0 (0)	0 (0)
20- 29	28	4 (14.3)	4 (14.3)
30-39	122	11 (9)	24 (19.7)
40-49	135	5 (3.7)	29 (21.5)
50-59	53	1 (1.9)	12 (22.6)
≥ 60	6	1 (16.7)	1 (16.7)
Total	347	22 (6.3)	70 (20.2)

( $X^2=8.99$ ,  $p$  value=0.06)

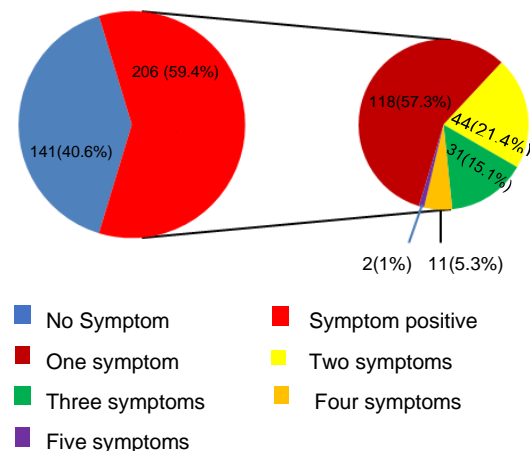


Fig. 1. Sexually transmitted infection symptoms in study group

Although more than half of the participants, 59.4% (206/347) revealed about their sexually transmitted infection symptoms

during interview. Remaining 40.6% (141/347) of study group did not show STI symptoms (Fig. 1). Among those clinic attendees with STI symptoms, the most common symptom was vaginal discharge, 70.9% (146/206). pruritus was revealed by 31.6% (65/206), frequent urination 28.6% (59/206), lower abdominal pain 27.2% (56/206) and dysuria was found in 14.1% (29/206).

*Chlamydia trachomatis* IgM was positive in 6.3% (13/206) of women with STI symptoms and 6.4% (9/141) of asymptomatic women. *Chlamydia trachomatis* IgG was positive in 19.4% (40/206) of women with STI symptoms and 21.3% (30/141) of asymptomatic women Fig. 2 (a & b).

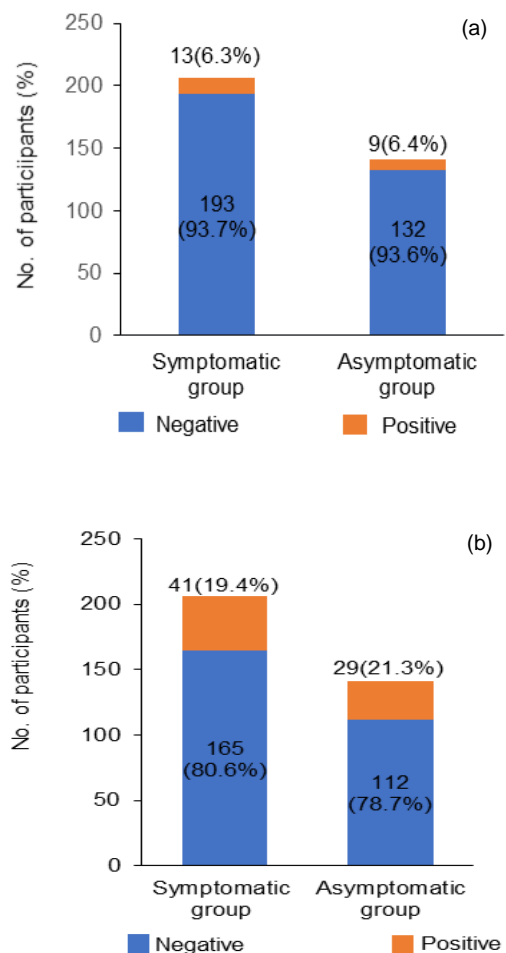
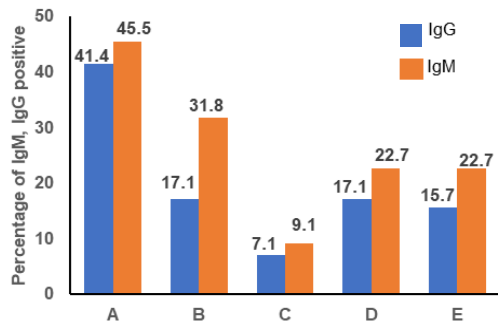


Fig. 2 (a & b). Prevalence of *Chlamydia trachomatis* IgM & IgG among symptomatic and asymptomatic women



A = Vaginal discharge      C = Dysuria  
 B = Pruritus                      D = Frequent urination  
 E = Lower abdominal pain

Fig. 3. Types of symptoms in *Chlamydia trachomatis* IgM, IgG positive participants

Among the *Chlamydia trachomatis* antibody positive participants, commonly reported symptoms were vaginal discharge: 45.5% (10/22) in IgM positive women, 41.4% (29/70) in IgG positive. Pruritus was reported as 31.8% (7/22) in IgM positive women, 17.1% (12/70) in IgG positive women (Fig. 3).

## DISCUSSION

Sexually transmitted infections (STIs) are a major global health problem with estimated 340 million new cases of curable infections occurring each year worldwide. Among them, *Chlamydia trachomatis* is one of the most common curable STIs worldwide.<sup>2</sup>

Ages of the participants in this study were relatively older than other studies. This is due to the usual phenomenon of the Cervical Cancer Screening Clinic attendees who are older than the STI clinic attendees. In 2010, a study done in STD clinic attendees was found to be younger age group than the present study. Ninety-eight percent were from 16 to 45 years age group.<sup>9</sup> Similarly, in 2014, a study had mentioned that the youngest age of the STD clinic attendees was 16 years and oldest age was 52 years with mean age of 31 years; so age of the participants were relatively younger than present study.<sup>10</sup>

The Cervical cancer Screening Clinic was established in Department of Medical Research since July, 2008 and opens every Tuesday and Friday. Most of the attendees were from the older age groups. This population represented who possessed sufficient knowledge about cervical cancer and they were the most usual attendees who come and took screening test for prevention of cervical cancer. This old age of participants may have to be considered in interpreting the seropositivity rate in this study. The small ratio of the participants concerning the sexually active young age group may explain the low positivity of this study.

According to different age groups, seropositivity of *Chlamydia trachomatis* IgM was found in 14.3% (4/28) and IgG in 14.3% (4/28) among 20-29 years age group. Among 30-39 years age group, IgM was positive in 9.0% (11/122) and IgG in 19.7% (24/122). Seropositivity of *Chlamydia trachomatis* IgM was found in 16.7% (1/6) and IgG in 16.7% (1/6) among women aged 60 years and above. Among them, 60 years and above age group has small sample size and its high positive rate is not statistically significant ( $X^2=8.99$ ,  $p=0.06$ ).

Therefore, the significantly highest acute infection rate (IgM positive) was among the participants in 20-29 years age group followed by 30-39 years group. This finding showed that relatively young age groups had high infection rate. In 2016, Maina, *et al* studied a total of 249 participants aged 18-49 years from the family planning clinic at Kenyatta National Hospital, the frequency of *Chlamydia trachomatis* infection was highest among women aged 25-29 years (21%) and lowest among those 45-49 years (5%).<sup>11</sup> In Aye Thidar Win's 2014 study, mean age of STD clinic attendees was 31 years and the infection rates was 43.08%.<sup>10</sup> Above studies showed that young age groups had higher infection rate than the older age groups. The finding of present study was in consistent with above studies.

This study found that acute *Chlamydia trachomatis* infection rate was highest in the

age between 20 and 39 years and this is the sexually most active age. This finding highlighted the need to implement regular screening for STIs among women of child-bearing age and introduction of routine screening procedures at Family Planning Clinics would help in reducing the burden of the disease among women.

In this study, 6.3% (22/347) of women were found to be positive for IgM and 20.2% (70/347) of women were found positive for IgG by *Chlamydia trachomatis* IgM, IgG ELISA. A wide range of prevalence rates of chlamydial infections have been reported from different countries. Joyee, *et al.* reported that IgM, IgA and IgG for genital chlamydial infection in STD patients was 22.4%, 28.7% and 58.7% respectively in Chennai, India.<sup>12</sup> In Saudi Arabia's study, the prevalence of seven sexually transmitted organisms was 31.8% among 135 participants by multiplex real-time PCR in fallopian tube specimens collected from women with and without ectopic pregnancy.<sup>13</sup> *Chlamydia trachomatis* infection was 19.2% among them: 27.4% (23/84) in ectopic pregnancy cases and 5.88% (3/51) in cases without ectopic pregnancy. There were many studies finding out the infection rate of *Chlamydia trachomatis* in different population groups in Myanmar.

A study among obstetrics and gynaecology patients of Mandalay General Hospital<sup>14</sup> showed that the overall prevalence rate of genital chlamydial infection was 6.4%, (5.7% for antenatal and 7.1% for gynecological patients) by testing cervical swabs with IDEA™ Chlamydia antigen test. Kyaw Oo, *et al.* reported that the prevalence of Chlamydial infection among Family Planning Clinic attendees in Yangon by testing cervical swabs with Chlamydia antigen test was 3.5%. These studies showed that *Chlamydia trachomatis* infection rate varied in different population groups and also varied according to laboratory methods of testing. As a result of the different characteristics of the study population and different methods used for Chlamydia detection, there was a wide variation in prevalence rates of Chlamydia infection. Infection rate in this study

was much higher when compared to Kyaw Oo's study which was done on apparently healthy women.<sup>15</sup> In this study, *Chlamydia trachomatis* IgM was positive in 6.3% (13/206) of women with STI symptoms and 6.4% (9/141) of asymptomatic women. *Chlamydia trachomatis* IgG was positive in 19.4% (40/206) of women with STI symptoms and 21.3% (30/141) of asymptomatic women.

A study conducted on subfertile and fertile women attending to North Okkalapa General and Teaching Hospital and Thingangyun Sanpya General Hospital showed that *C. trachomatis* IgG antibodies were detected in 63% of subfertile women and 37% of pregnant women.<sup>16</sup> In Oakeshoot's study in London, baseline prevalence of chlamydia infection was 5.4% in university students with symptoms and 5.9% in controls without symptoms among 2529 sexually active female students.<sup>17</sup>

A study in pregnant women attending antenatal clinic at Central Women Hospital, Yangon showed that the prevalence of chlamydial infection in asymptomatic pregnant women was 7.1%.<sup>18</sup> These findings showed that the screening of Chlamydia infection in both symptomatic and asymptomatic women was beneficial and especially women presenting with STI symptoms should be screened to assure early diagnosis and timely treatment.

In the present study, antibody to *C. trachomatis* IgM was present in 10 (7.1%) of 140 women with history of subfertility and 12 (5.8%) of 207 women with no history of subfertility. Antibody to *C. trachomatis* IgG was present in 26 (18.6%) of 140 women with history of subfertility and 44 (21.3%) of 207 women with no history of subfertility. A study conducted on subfertile and fertile women attending to North Okkalapa General and Teaching Hospital and Thingangyun Sanpya General Hospital showed that *C. trachomatis* IgG antibodies were detected in 63% of subfertile women and 37% of pregnant women.<sup>16</sup> Baldwin Toye and group found that antibody to

*C. trachomatis* was present in 32 (72.7%) of 44 women with tubal infertility compared with 9 (32.1%) of (28.9%) of 190 pregnant women.<sup>19</sup> In the present study, among the *Chlamydia trachomatis* antibody positive participants, commonly reported symptoms were vaginal discharge: 45.5% (10/22) in IgM positive women, 41.4% (29/70) in IgG positive.

Pruritus was reported as 31.8% (7/22) in IgM positive women, 17.1% (12/70) in IgG positive women. Maina and group found that the most commonly reported symptoms among the *Chlamydia trachomatis* infected participants were vaginal discharge (36%) and lower abdominal pain (33%).<sup>11</sup> In Aye Thidar Win's study, presenting symptoms of participants were urogenital discharge, which was the commonest presentation (70.8% of total study population), dysuria (43.1%), frequency (18.5%), pruritus and lower abdominal pain (16.9% each), inguinal lymphadenopathy and genital ulcers (6.2% each), and fever (1.5%).<sup>10</sup>

### Conclusion

This study identified the current situation about prevalence of *Chlamydia trachomatis* infection in a group of population. Findings of this study might be helpful to figure out the extent of infection in women, and useful to realize the importance of infection screening for effective planning and management in STI control programmes and also in the clinical practice. It also showed the proportion of infection in asymptomatic group indicating that early diagnosis and timely treatment can attain with screening of the high risk population although they are asymptomatic.

### Competing interests

The authors declare that they have no competing interests.

## REFERENCES

1. World Health Organization. Global Strategy for the Prevention and Control of Sexually Transmitted Infections, 2006-2015. WHO, 2006, Geneva, Switzerland.
2. Newman L, Rowley J, Hoorn SV, Wijesooriya NS, Unemo M, Low N, *et al.* Global estimates of the prevalence and incidence of four curable sexually transmitted infections in 2012 based on Systematic Review and Global Reporting. *Public Library of Science ONE* 2015; 10(12): e0143304.
3. Mishori R, Mc Claskey EL & Winklerprins VJ. *Chlamydia trachomatis* Infections: Screening, Diagnosis, and Management. *American Family Physician* 2012; 86(12): 1127-1132.
4. Mascellino MT, Ciardi MR, Oliva A, Cecinato F & Borgese L. *Chlamydia trachomatis* detection in a population of asymptomatic and symptomatic women: Correlation with the presence of serological markers for this infection. *New Microbiologica* 2008; 31:249-256.
5. Carey AJ & Beagley KW. *Chlamydia trachomatis*, a hidden epidemic: Effects on female reproduction and options for treatment. *American Journal of Reproductive Immunology* 2010; 63: 576-586.
6. Watson EMMA J, Templeton A, Russell I, Paavonen J, Mardh PA, Stary A, *et al.* The accuracy and efficacy of screening tests for *Chlamydia trachomatis*: A systematic review. *Journal of Medical Microbiology* 2002; 51: 1021-1031.
7. Breitkopf DM. A review of genital Chlamydial infections. *Hospital Physician* 2000; February: 27-34.
8. Ngeow YF, Rachagan SP & Ramachandran S. Prevalence of Chlamydial antibody in Malaysians. *Journal of Clinical Pathology* 1990; 43: 400-402.
9. Khin Nyein Aye. A study on syphilis, gonorrhoea and chlamydial genital Infections among female patients attending Central Sexually Transmitted Clinic, Yangon. [MMedSc thesis]. University of Medicine 1: Yangon; 2010.
10. Aye Thidar Win. A study on sexually transmitted bacterial infections among patients attending Sexually Transmitted Disease Clinics, Yangon. [MMedSc thesis]. University of Medicine 1: Yangon; 2014.
11. Maina AN, Kimani J & Anzala O. Prevalence and risk factors of three curable sexually transmitted infections among

- women in Nairobi, Kenya. *Bio Med Central Research Notes* 2016 (9): 193.
12. Joyee AG, Thyagarajan SP, Reddy EV, Rajendran P, Venkatesan C & Ganapathy M. Diagnostic utility of serologic markers for genital chlamydial infection in STD patients in Chennai, India. *The Journal of Association of Physicians of India* 2007; 55: 777-780.
  13. Ashshi AM, Batwa SA, Kutbi SY, Malibary FA, Batwa M & Refaat B. Prevalence of 7 sexually transmitted organisms by multiplex real-time PCR in Fallopian tube specimens collected from Saudi women with and without ectopic pregnancy. *BioMed Central Infectious Diseases* 2015; 15:569.
  14. Mary Krasu, Saw Lwin, San Yi & Khin Saw Nwe. Chlamydial Infection among obstetrics and gynaecology patients of Mandalay General Hospital. *Myanmar Medical Journal* 2000; 44(3): 125-129.
  15. Kyaw Oo, Khin May Oo, Mar Mar Nyein, Kyaw Moe, Than Than Tin, Hlaing Myat Thu, *et al.* Prevalence and determinants of reproductive tract infections among family planning clinic attendees in Yangon. *Programme and Abstract of the 38<sup>th</sup> Myanmar Health Research Congress*; 2010; Yangon, Myanmar. p.49.
  16. Khin Mar Cho. Serum Anti-chlamydial antibody in subfertile and fertile female. [MMedSc *thesis*]. University of Medicine 2: Yangon; 2015.
  17. Oakeshott P, Kerry S, Aghaizu A, Atherton H, Hay S & Taylor Robinson D. Randomised controlled trial of screening for *Chlamydia trachomatis* to prevent pelvic inflammatory disease: the POPI (prevention of pelvic infection) trial. *British Medical Journal* 2010, 340(1): 1640-1642.
  18. Cho Cho Oo, Kyi Kyi Thinn, Win Win Maw, Thuzar Han & Aye Aye Win. Chlamydial infection in pregnant women attending antenatal clinic at Central Women Hospital, Yangon. *Myanmar Medical Journal* 2002; 46(1- 4): 25-28.
  19. Tøye B, Laferrière C, Claman P, Jessamine P & Peeling R. Association between antibody to the chlamydial heat-shock protein and tubal infertility. *The Journal of Infectious Diseases* 1993; 168(5):1236-1240.