Original article

A retrospective study of relationship between white blood cell counts in cervical discharge and Chlamydial cervicitis among young adults: is the simple microscope an alternative method for diagnosing the disease?

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Abstract

Objectives This retrospective study aimed to examine the relationship between white blood cell counts and Chalmydial infection of the uterine cervix among young adults in the STI Clinic, Office of Disease Prevention and Control, region 10 Chiang Mai.

Methods Two hundred and twenty women, who were aged less than 25 years and attended the STI clinic in 2011 Fiscal year, had their cervical discharge collected and examined in the laboratory by microscopic examination (gram stain) and the In-house PCR Chlamydia test, which already compared to a standard commercial method. The result of the In-house PCR Chlamydia test was acceptable at 95 percent confident interval. The target population was classified into two groups: sex workers (140 people) and non-sex workers (80 people). The white blood cell count in their cervical discharge and the result of the In-house PCR Chlamydia test were examined via Chi-Square tests for a significant correlation in each group.

Results A significant correlation between white blood cell count in cervical discharge and Chlamydial cervicitis was presented in the sex worker group; with the cutoff point of the leukocyte count being ≥5 cells/1,000X microscopic power field (p value: < 0.001). Sensitivity of the "white blood cell" gave a positive diagnostic result for Chlamydial cervicitis (at least 5 cells/1,000X microscopic power field) in 74.29 percent of the sex worker group with 72.38 percent specificity. In contrast, there was no significant relationship between the white blood cell count in cervical discharge and Chlamydial cervicitis among the non-sex worker group. Sensitivity of the "white blood cell" gave a positive diagnostic result for Chlamydial cervicitis (at least 5 cells/1,000X microscopic power field) in 79.17 percent of the non-sex worker group with 41.07 percent specificity.

Conclusions The white blood cell count criterion of ≥5 cells/1,000X microscopic power field in a cervical smear provides an alternative diagnostic method for Chlamydial cervicitis detection in sex workers aged less than 25 years. **Chiang Mai Medical Journal 2013;52(1-2):1-10.**

Keywords: white blood cell count, Chlamydial cervicitis, young adult women, sex workers, non-sex workers, Chiang Mai

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Introduction

Chlamydial infection of the genital tract is caused by *Chlamydia trachomatis*. The infection is a worldwide Sexually Transmitted Infection (STI) and common cause of genital discharge (urethral, cervical and vaginal). The World Health Organization (WHO) estimated that the global incidence of chlamydial infection in 2008 was 105.7 million cases. In Southeast Asia, 7.2 million new cases of the infection were estimated [1]. In countries where public service makes diagnosis widely available (in the UK and USA), Chlamydial infection is the most common STI in young adults [2,3]. Chlamydial infection is curable with simple antibiotics such as Doxycycline, Azithromycin, tetracycline and erythromycin [4]. Most infected people, especially women, are asymptomatic, but if the infection is left untreated, it may persist for years, in which time it can be transmitted to other people via sexual intercourse and mother to child. It has been estimated that up to 40 percent of untreated women will develop Pelvic Inflammatory Disease (PID) and a quarter of them will become infertile [5]. The infection also can cause genital tract infections (urethritis, orchitis, epididymitis) and inflammation of the organs may develop to infertility in men [5]. Infants who are delivered by infected women are liable to present with conjunctivitis and pneumonia; and these conditions can cause morbidity and mortality [5].

Public STI clinics in Thailand have not performed routine diagnosis of chlamydial genital infection because the diagnosis is expensive and needs advanced laboratory methods, for example, Nucleic Acid Amplification Tests (NAATs) and cell culture [4,6]. However, some hospitals and clinics can provide services for people who want NAATs for diagnosing Chlamydial infection. According to the Thai guideline on STI diagnosis and treatment 2010 (latest version), a microscopic examination is used primarily for differential diagnosis of urethral and vaginal discharge. Therefore, there is no diagnosis of Chlamydial genital infection; as it is included in Non-Gonococcal genital infection [7]. In the case of urethral discharge, gram negative diplococcic is a marker for diagnosing gonococcal urethritis; and white blood cell counts, which are more than 5 cells/1,000X microscopic power field, are a marker for diagnosing Non-Gonococcal Urethritis (NGU). Regarding vaginal discharge, gram negative diplococcic also is a marker for diagnosing gonococcal cervicitis, but there is no white blood cell count criterion for diagnosing Non-Gonococcal Cervicitis (NGC) in the Thai guideline [7].

This retrospective study aimed to examine the relationship between white blood cell count and Chalmydial infection of the uterine cervix among young adults in the STI Clinic, Office of Disease Prevention and Control, region 10 Chiang Mai. The result of the study could act as scientific evidence for alternative use of a simple microscopic test for diagnosing Chlamydial cervicitis among youth in areas with no molecular laboratory. It also would help medical and public health personnel to control the disease on a much broader and more feasible scale.

Methods

Study subjects

This retrospective study comprised young female subjects, who were aged less than 25 years. They underwent pelvic examination, and their cervical discharge was collected for microscopic examination and Chlamydia testing in the STI Clinic, Office of Disease Prevention and Control, region 10 Chiang Mai in 2011 Fiscal year. The medical records of 220 cases were reviewed. The subjects were classified into two groups: sex workers and non- sex workers. Each individual volunteered to identify themselves to the Clinic and give personal details including a history of risky behavior. Laboratory results of the white blood cell count, and Polymerase Chain reaction (PCR), which is a subset of NAATs, were collected and analyzed from each group.

Specimen collection

None of the subjects had menstruation during the specimen collection. They underwent standard pelvic examination with speculum, and their cervical discharge was collected from the cervical ostium of the uterus. A nurse in the STI clinic used a metal loop to collect specimens for the white blood cell count. A sterile swab (with plastic handle) was used to collect

the discharge for detecting DNA of *Chlamydia trachomatis* via the PCR method in the Department of Medical Technology, Faculty of Associated Medical Sciences, Chiang Mai University. Each specimen was separated and labeled with a code to prevent an identification error. Microscopic examination was performed immediately after specimen collection. The collection swabs from the PCR test were kept at room temperature overnight until dry; with their plastic handle planted in clay in an upright position to keep them separate and prevent contamination. The dry swab was sealed in a plastic zip-up bag before being sent to the laboratory for the Chalmydia test.

Laboratory diagnosis

1. White blood cell count:

The white blood cell count in the cervical discharge was examined by standard gram stain procedure. Grading of the white blood cell count was defined as follows:

Negative result: the number of white blood cells is less than 5 cells per 1,000X microscopic power field.

Grade 1 (1+): the number of white blood cells ranges from 5 to 10 cells per 1,000X microscopic power field.

Grade 2 (2+): the number of white blood cells ranges from11 to 20 cells per 1,000X microscopic power field.

Grade 3 (3+): the number of white blood cells ranges from 21 to 40 cells per 1,000X microscopic power field.

Grade 4 (4+): the number of white blood cells is more than 40 cells per 1,000X microscopic power field.

Grade 1 and 2 were identified as a "low level of white blood cell count" group, while grade 3 and 4 were seen as a "high level of white blood cell count" group.

2. PCR:

In-house Taqman-based multiplex real time PCR, for detecting *N. gonorrhoeae* and *C. trachomatis*, was selected for diagnosing gonoccoccal and chalmydial infection. This study focused on detecting *C. trachomatis* and therefore excluded the isolation of gonococcal infection. This method was developed by the Department of Medical Technology, Faculty of Associated Medical Sciences, Chiang Mai University [8]. It used two pairs of primers, which were specific to the cryptic plasmid DNA sequence of each organism, and produced 147 and 118 base pairs of *N. gonorrhoeae* and *C. trachomatis*, respectively. Two Taqman labeled probes were used simultaneously for DNA detection of the two microorganisms.

This technique was compared with a standard commercial method (Roche Multiplex AMPLICOR CT/NG PCR) and the result is shown in Table 1 [8].

According to Table 1, the specimens were examined simultaneously by the two methods, with the Roche Multiplex AMPLICOR CT/NG PCR identified as the gold standard in this case. There were 184 specimens from 188 samples (97.87 percent), which showed common results. As shown in Table 1, the approximate large-sample confidence interval was examined for proportion, which was the same in both methods, with a 95 percent confidence interval of between 0.96 and 0.99. The 97.87 proportion of the "In-house Taqman-based multiplex Real Time PCR for detecting N. gonorrhoeae and C. trachomatis" was in the range of the 95 percent confident interval. Therefore, in the case of chlamydia laboratory diagnosis, the method of "In-house Taqman-based multiplex Real Time PCR for detecting *N. gonorrhoeae* and *C. trachomatis*" can be used as a substitute for the "Roche Multiplex AMPLICOR CT/NG PCR".

Data analysis

The data in each group (sex workers or non sex workers) were analyzed separately. Results of the white blood cell count were classified into 3 groups: "negative result", "low level of white blood cell count", and "high level of white blood cell count". The PCR results were classified into 2 groups: negative and positive. The sensitivity and specificity of the leukocyte count criteria were calculated, and the relationship between the white blood cell count and PCR diagnosis were examined by Chi-Square tests. The OpenEpi version 3 [9] is a free and open source software for epidemiologic statistics, and was used for the data analysis. The 95 percent confident interval was used as a cutoff point for determining statistical significance.

Results

The results of this study were classified into two groups: sex workers and non-sex workers, and those for the sex worker group are described and analyzed comparatively in Table 2 and 3, respectively.

According to Table 2, there were 140 sam-

Table 1. Accuracy of the "In-house Taqman-based multiplex Real Time PCR for detecting N. gonorrhoeae and C. trachomatis" with the "Roche Multiplex AMPLICOR CT/NG PCR" used as a gold standard [8]

Comparable test		Roche multiplex AMPLICOR CT/NG PCR		Total
		Positive	Negative	
In-house Taqman-based multiplex Real Time PCR for detection of *N. gonorrhoeae* and *C. trachomatis*	Positive	19	4	23
	Negative	0	165	165
Total		19	169	188

Table 2. Number and percentages of the white blood cell count and *C. trachomatis* detection in cervical discharge via the "In-house Taqman-based multiplex Real Time PCR for detecting *N. gonorrhoeae* and *C. trachomatis*" among the sex worker group

Results of the microscopic examination (gram stain)	Results of the In-house PCR test for *C. trachomatis*					
	Negative	Column%	Positive	Column%	Total	Column%
Negative(less than 5 cells/oil power field)	76	72.4	9	25.7	85	60.7
Low white blood cell count (5-20 cells/oil power field)	19	18.1	16	45.7	35	25
High white blood cell count (more than 20 cells/oil power field)	10	9.5	10	28.6	20	14.3
Total	105	100	35	100	140	100

Table 3. Chi-Square tests of statistically significant relationships between the white blood cell count and C. trachomatis detection in cervical discharge via the "In-house Taqman-based multiplex Real Time PCR for detecting N. gonorrhoeae and C. trachomatis" among the sex worker group

Start | Enter | Results | Examples | Help

Single Table Analysis

		The results of the In-house PCR test for C. trachomatis		
		Negative	Positive	
The results of the microscopic exam	Negative	76	9	85
	Low WBC count	19	16	35
	High WBC count	10	10	20
		105	35	140

Chi Square for R by C Table

Chi Square= 24.09
Degrees of Freedom= 2
p-value= 0.000005868

Cochran recommends accepting the chi square if:
1. No more than 20% of cells have expected < 5.
2. No cell has an expected value < 1.

In this table:
None of 6 cells have expected values < 5.
No cells have expected values < 1.

Using these criteria, this chi square can be accepted.

Expected value = row total*column total/grand total

Rosner, B. Fundamentals of Biostatistics. 5th ed. Duxbury Thompson Learning. 2000; p. 395

Results from OpenEpi, Version 3, open source calculator--RbyC
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or select text to copy and paste to other programs.

ples of cervical discharge. The prevalence of Chlamydial cervicitis, diagnosed by the In-house PCR Chlamydia test, was 25 percent in this group. The negative results of microscopic examination were the same as those in the In-house PCR Chlamydia test, which accounted for 72.4 percent in the group. The low white blood cell count had the maximum percentage of relationship with positive results of the In-house PCR Chlamydia test, which was 45.7 percent. The accuracy parameters of positive results for the "white blood cell count", regardless of the "low or high white blood cell count" were calculated; and the sensitivity and specificity was 74.29 percent (95% CI: 56.74% to 87.48%) and 72.38 percent (95% CI: 62.80% to 80.66%), respectively. The data were analyzed and examined for significant relationship between the white blood cell count in cervical discharge and results of the In-house PCR Chlamydia test

Table 4. Number and percentages of the white blood cell count and *C. trachomatis* detection in cervical discharge via the "In-house Taqman-based multiplex Real Time PCR for detecting *N. gonorrhoeae* and *C. trachomatis*" among the non-sex worker group

Results of the microscopic examination (gram stain)	Results of the In-house PCR test for *C. trachomatis*					
	Negative	Column%	Positive	Column%	Total	Column%
Negative(less than 5 cells/oil power field)	23	41.1	5	20.8	28	35
Low white blood cell count (5-20 cells/oil power field)	27	48.2	13	54.2	40	50
High white blood cell count (more than 20 cells/ oil power field)	6	10.7	6	25	12	15
Total	56	100	24	100	80	100

Table 5. Chi-Square tests of statistically significant relationships between the white blood cell count and C. trachomatis detection in cervical discharge via the "In-house Taqman-based multiplex Real Time PCR for detecting *N. gonorrhoeae* and *C. trachomatis*" among the non-sex worker group

Start | Enter | Results | Examples | Help

Single Table Analysis

		The results of the In-house PCR test for C. trachomatis		
		Negative	Positive	
The results of the microscopic exam	Negative	23	5	28
	Low WBC count	27	13	40
	High WBC count	6	6	12
		56	24	80

Chi Square for R by C Table

Chi Square= 4.371
Degrees of Freedom= 2
p-value= 0.1124

Cochran recommends accepting the chi square if:
1. No more than 20% of cells have expected < 5.
2. No cell has an expected value < 1.

In this table:
17% of 6 cells have expected values < 5.
No cells have expected values < 1.

Using these criteria, this chi square can be accepted.

Expected value = row total*column total/grand total

Rosner, B. Fundamentals of Biostatistics. 5th ed. Duxbury Thompson Learning. 2000; p. 395

Results from OpenEpi, Version 3, open source calculator--RbyC
Print from the browser with ctrl-P
or select text to copy and paste to other programs.

via Chi-square tests. The OpenEpi version 3 [9] is a free and open source software for epidemiologic statistics, and was used as a tool.

As shown in Table 3, the Chi-Square value was 24.09, degree of freedom 2, and the p value less than 0.001. These figures mean that the white blood cell count in cervical discharge and result of the In-house PCR Chlamydia test have a statistically significant relationship in the sex worker group, provided the negative and positive cutoff point for the number of white blood cells is less than and at least 5 cells per 1,000X microscopic power field, respectively, regardless of the "low or high level of white blood cell count".

The results of this study in the non-sex worker group are described and analyzed comparatively in Table 4 and 5, respectively.

As shown in Table 4, there were 80 specimens of cervical discharge. The prevalence of Chlamydial cervicitis, diagnosed by the In-house PCR Chlamydia test, was 30 percent in this group. The negative results of microscopic examination were the same as those in the In-house PCR Chlamydia test, which accounted for 41.1 percent. The low white blood cell count had the maximum percentage of relationship with negative results of the In-house PCR Chlamydia test, which was 48.2 percent. In addition, the low white blood cell count also had the maximum percentage of relationship with positive results of the In-house PCR Chlamydia test, which was 54.2 percent. The accuracy parameters of positive results for the "white blood cell count", regardless of the "low or high white blood cell count" were calculated; and the sensitivity and specificity was 79.17 percent (95%CI: 57.84% to 92.79 %) and 41.07 percent (95% CI: 28.10% to 55.02%), respectively. The data were analyzed and examined for significant relationship between the white blood cell count in cervical discharge and results of the In-house PCR Chlamydia test via Chi-square tests. The OpenEpi version 3 [9] is a free and open source software for epidemiologic statistics, and was used as a tool.

As shown in Table 5, the Chi-Square value was 4.371, degree of freedom 2, and the p value 0.1124 (more than 0.05). The figures mean that the white blood cell count in cervical discharge and result of the In-house Chlamydia test had no statistically significant relationship in the non-sex worker group.

Discussion

The diagnosis of Chlamydial infection has been limited in the Thai public STI service because it needs expensive molecular tests and/or a cell culture laboratory, unlike diagnosing Gonococcal infection, which is easier and cheaper. Gonococcal infection can be diagnosed immediately by microscopic examination and confirmed by culture, which takes a few days for culture turnaround. According to the latest Thai Guideline 2010, there is no diagnosis of Chlamydial infection; however, the disease is a subset of Non-Gonococcal infection [7]. The diagnosis of Non-Gonococcal Urethritis (NGU) has a white blood cell count criterion, whereas the diagnosis of Non-Gonococcal Cervicitis (NGC) has not [7]. Therefore, simple alternative methods for diagnosing the disease, for example microscopic examination, have been studied. An initial report of the relationship between *C. trachomatis* and microscopic results was reported decades ago. Brunham et al reported this correlation in 1984, and their result showed that C. trachomatis isolated by cell culture was associated statistically with the presence of 10 cells or more from white blood cell counts in cervical discharge, in new female patients attending the STI clinic in Seattle [10]. Since then, a number of similar the studies have been reported on the leukocyte cutoff point, gold standards used and varied populations, as shown in Table 6.

According to the studies shown in Table 6, the prevalence of Chlamydia cervicitis ranges from 12% to 20.9% and the two significant leukocyte cutoff points were ≥5 and ≥10 cells/1,000X microscopic power field. Surprisingly, the result in study number 2 and 5 in Table 6 showed that the highest sensitivity of the white blood cell count criterion was ≥5 cells/1,000X microscopic power field, whereas the ≥10 cell criterion in study number 2, and ≥10, ≥15, ≥20 and ≥25 cell criteria in study number 5 had lower sensitivity than the ≥5 cell criterion. These paradoxical events also present in this study, which showed that the "low white blood cell count" had the highest percentage relationship with positive results of the In-house PCR Chlamydia test, while the "high white blood cell count" did not. This paradoxical event explained that increasing the cutoff-point of the white blood cell count improves the specificity of the criterion, but it also showed the expense of reduction in sensitivity (inverse relationship between sensitivity and specificity) [14].

Unlike the studies shown in Table 6, this study was conducted in the STI Clinic in Chiang

Table 6. Summary of key information among studies that discovered the correlation between white blood cell count and Chlamydial cervicitis [10,11,12,13,14]

Researchers	Time of conducting the studies	Prevalence of Chlamydial cervicitis	Significant white blood cell count cutoff point	Gold standard used	Target populations	The cities for conducting the studies	Notes
1. Brunham et al [10]	No information (published year: 1984)	20.9%	≥ 10 cells/1,000X microscopic power field	Cell culture	100 new female patients attending the STI clinic	Seattle, USA	No note
2. Moscicki et al [11]	October 1983 – December 1984	18%	≥ 5 cells/1,000X microscopic power field	Cell culture	193 females attending the adolescent clinic	San Francisco, USA	Sensitivity of the ≥ 5 cells criterion was significantly higher than that in the ≥ 10 cells one
3. Ryan et al [12]	1984-1986	15%	≥ 10 cells/1,000X microscopic power field and ≥ 30 cells/1,000X microscopic power field	Cell culture	779 women attending the STI clinic	Seattle, USA	Both the ≥ 10 cells and ≥ 30 cells criteria were significantly associated with *C. trachomatis*
4. Myziuk, Romanowski, and Brown [13]	1997-1998	13%	> 10 cells/1,000X microscopic power field	Either Direct Fluorescent Antibody (DFA) test or Cell culture	220 young adult women attending the STI clinic	Alberta, Canada	No note
5. Manavi, Conlan, and Barrie [14]	May to December 2002	12%	≥ 5 cells/1,000X microscopic power field	Ligase Chain Reaction (LCR)	138 women attending the STI clinic	Edinburgh, UK	Sensitivity of the ≥ 5 cell criterion was the highest.

Mai, Thailand, and it classified the target population into two groups: sex workers and non-sex workers. The significant relationship between white blood cell count in cervical discharge and Chlamydial cervicitis was presented in the sex worker group, who were under 25 years old; with the cutoff point of the leukocyte count being ≥5 cells/1,000X microscopic power field. However, there was no significant correlation between white cell count in cervical discharge and Chlamydial cervicitis among the non-sex worker group, who were younger than 25 years old. Fortunately, this finding may prevent the misdiagnosis problem that could be occurred if STI health personnel totally use the evidence from the previous studies conducted in Western countries, which regardless of sex workers or non-sex workers. The misdiagnosis can cause the problem of pre-marital and marital relationship among the non-sex worker group, who has real monogamous relationships. Therefore, the use of the evidence from Western countries in Thailand should be reconsidered.

The difference in results between the two groups could be explained by sex-workers visiting STI clinics regularly for monthly health check-ups, regardless of whether they are ill or not. On the other hand, almost all non-sex workers visit the STI clinic only when they have symptoms. Furthermore, in this study, the percentage of positive white blood cell counts in cervical smears among the non-sex worker group was higher than those in the sex worker group (65% versus 39%). Therefore, the non-sex worker group had a higher prevalence of Chalmydial cervicitis than the sex-worker group (30% versus 25%). In the case of no association between white blood cell counts in cervical smears and cervical cervicitis, this study hypothesized that the cervical smears in non-sex workers could be mixed between highly suspected STI and non-directly associated STI leukorrhea. This was because the raw data showed that the percentage of non-directly associated STI discharge (bacterial vaginosis or candida vaginitis) was higher among the non-sex worker group than in the sex worker group (12.5% versus 7.8%). This study also found Chlamydia and non-directly associated STI co-infections in only 2 cases in the sex worker group and 1 case in the non-sex worker group. In addition, there may be some other causes of physiological or pathological leukorrhea that facilitate the non-sex workers at the STI Clinic. Consequently, a significant relationship between the white blood cell count and Cervical cervicitis was not found in the non-sex worker group.

In summary, this study witnessed that all the above Chlamydial cervicitis cases in sex workers aged less than 25 years can be diagnosed alternatively by the white blood cell count criterion, which is ≥5 cells/1,000X microscopic power field in a cervical smear. However, simple alternative methods for diagnosing the disease among other groups, or the same group in other Thai settings (asymptomatic non-sex workers or proactive survey in a community) still need further study.

Limitations of the study

This study was retrospective and therefore some other factors that associated with abnormal vaginal discharge were not prepared for collection, for example, the contraceptive method used, frequency of sexual intercourse per week, the history of vaginal douche or insertion of foreign bodies and underlying diseases. Another limitation was the passive case findings. The subjects of this study, especially the non-sex workers, visited the STI clinic because they were ill. Therefore, a vast majority of asymptomatic infection among non-sex workers was not examined.

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Conflict of Interest

Each of the authors has no conflicts of interest in this submitted manuscript.

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การศึกษาแบบย้อนหลังเพื่อหาความสัมพันธ์ ระหว่างจำนวนเซลล์เม็ดเลือดขาวในตกขาว กับการอักเสบของปากมดลูกที่เกิดจากการติดเชื้อคลามิเดียในกลุ่มเยาวชน; การตรวจด้วยวิธีการนับจำนวนเซลล์เม็ดเลือดขาวโดยใช้กล้องจุลทรรศน์จะเป็นทางเลือกในการวินิจฉัยโรคนี้ได้หรือไม่

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บทคัดย่อ

วัตถุประสงค์ เพื่อหาความสัมพันธ์ระหว่างจำนวนเซลล์เม็ดเลือดขาวในตกขาว กับการอักเสบของปากมดลูกที่เกิดจากการติดเชื้อคลามิเดียในกลุ่มเยาวชนที่คลินิกกามโรค, สำนักงานป้องกันควบคุมโรคที่ 10 เชียงใหม่

วิธีการศึกษา ผู้มารับบริการเยาวชนหญิงที่อายุน้อยกว่า 25 ปี จำนวน 220 คน ที่มารับบริการที่คลินิกกามโรคแห่งนี้ ในปีงบประมาณ 2554 ได้ถูกเก็บตกขาวเพื่อส่งตรวจหาจำนวนเซลล์เม็ดเลือดขาวโดยใช้กล้องจุลทรรศน์ และตรวจหาการติดเชื้อคลามิเดียด้วยวิธีปฏิกิริยาลูกโซ่พอริเมอเลสที่พัฒนาขึ้น ซึ่งได้ถูกทดสอบกับวิธีมาตรฐานแล้วพบว่าผลที่ได้ออกมาเป็นที่ยอมรับได้ ที่ค่าความเชื่อมั่นร้อยละ 95 กลุ่มเป้าหมายจะถูกแบ่งออกเป็น สองกลุ่ม คือ กลุ่มหญิงบริการ และกลุ่มที่ไม่ใช่หญิงบริการ จำนวนเม็ดเลือดขาวกับผลการตรวจด้วยวิธีปฏิกริยาลูกโซ่พอริเมอเลสดังกล่าว จะถูกหาความสัมพันธ์โดยวิเคราะห์แยกรายกลุ่มด้วยการทดสอบไคสแคร์

ผลการศึกษา พบความสัมพันธ์อย่างมีนัยสำคัญทางสถิติระหว่างจำนวนเม็ดเลือดขาวกับการอักเสบของปากมดลูกที่เกิดจากการติดเชื้อคลามิเดียในกลุ่มหญิงบริการ โดยที่จุดตัดของจำนวนเซลเม็ดเลือดขาวในตกขาวคือ มากกว่าเท่ากับ 5 ตัว ต่อกำลังขยาย 1,000 เท่า โดยที่การใช้เกณฑ์การพบเม็ดเลือดขาว มากกว่าเท่ากับ 5 ตัว ต่อกำลังขยาย 1,000 เท่า มีค่าความไวในการวินิจฉัยปากมดลูกอักเสบจากการติเชื้อคลามิเดียเท่ากับ ร้อยละ 74.29 และมีความจำเพาะเท่ากับ ร้อยละ 72.38 แต่ในทางตรงกันข้าม ไม่พบความสัมพันธ์ระหว่างจำนวนเม็ดเลือดขาวกับปากมดลูกอักเสบจากการติดเชื้อคลามิเดียดังกล่าว ในกลุ่มที่ไม่ใช่หญิงบริการ โดยที่หากใช้เกณฑ์การพบเม็ดเลือดขาวอย่างเดียวกัน พบว่าในกลุ่มที่ไม่ใช่หญิงบริการ จะมีค่าความไวในการวินิจฉัยปากมดลูกอักเสบจากการติเชื้อคลามิเดียเท่ากับ ร้อยละ 79.17 และมีความจำเพาะเท่ากับ ร้อยละ 41.07

สรุปผลการศึกษา การอักเสบของปากมดลูกที่เกิดจากการติดเชื้อคลามิเดียในกลุ่มหญิงบริการ ที่อายุน้อยกว่า 25 ปี สามารถวินิจฉัยได้โดยการตรวจหาจำนวนเซลเม็ดเลือดขาวในตกขาว โดยที่จุดตัดของจำนวนเซลเม็ดเลือดขาวในตกขาวคือ มากกว่าเท่ากับ 5 ตัว ต่อกำลังขยาย 1,000 เท่า **เชียงใหม่เวชสาร 2556;52(1-2):1-10.**

คำสำคัญ: จำนวนเซลล์เม็ดเลือดขาว การอักเสบของปากมดลูกที่เกิดจากการติดเชื้อคลามิเดีย เยาวชนหญิง หญิงบริการ ผู้ที่ไม่ใช่หญิงบริการ เชียงใหม่