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Prevalence of Gonorrhoeal and/or Chlamydial Infection in Hospitalized Patients with Pelvic Inflammatory Disease

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ABSTRACT

Objectives: To determine the prevalence of gonorrhoeal and/or chlamydial infection in hospitalized patients with pelvic inflammatory disease (PID) and to evaluate the factors which might be associated with these infections.

Study design: Cross-sectional study.

Setting: Department of Obstetrics and Gynaecology, Faculty of Medicine Siriraj Hospital.

Materials and Methods: Seventy-six women with pelvic inflammatory disease (PID), who were admitted at Siriraj Hospital from December 2007 to August 2008, were recruited. Gonorrhoeal and chlamydial infections were identified by polymerase chain reaction (PCR) from endocervical swab. Demographic data were utilized for assessment regarding factors associated with gonorrhoeal or chlamydial infections. The student T-test, Chi-square and multivariable regression analysis were applied for analysis.

Results: The prevalence of gonorrhoeal and/or chlamydial infection in PID patients was 35.5%. Gonorrhoeal infection was detected for 23.7% of PID patients whereas Chlamydial infection was detected for 19.7%. Nevertheless, 33.3% of patients who had gonorrhoeal infection were found to have co-infection of C.trachomatis. Analysis by multivariable logistic regression, revealed that factors associated with gonorrhoeal and/or chlamydial infection were socioeconomic factor i.e. the women who had income less than 5,000 Baht per month (AOR = 3.9; 95%CI = 1.03-14.86; p-value = 0.045) and those who had sexual intercourse during menstruation period (AOR = 6.19, 95%CI = 1.42-26.9; p-value = 0.015).

Conclusion: About one-third of women with PID had gonorrhoeal and/or chlamydial infection. Women who had lower socioeconomic status and had sexual intercourse during menstrual bleeding were more likely to have these infections.

Keywords: gonorrhoeal infection, chlamydial infection, pelvic inflammatory disease, polymerase chain reaction

Introduction

Pelvic inflammatory disease (PID) is a spectrum of infections of the female genital tract. It is a common and serious complication of some sexually transmitted diseases (STDs), especially gonorrhoeal (GC) and chlamydial (CT) infections. N.gonorrhoea could be isolated from the cervix in 20-80% of acute PID[1,2] and up to two thirds of PID

cases were associated with a chlamydial infection.[3] However, most studies were conducted before HIV outbreak and the availability of more sensitive of DNA test and may therefore underestimate the proportion of these infections. The conventional detection of these infections is by gram staining and culture for organism from endocervical swab. This technique is 50-60% sensitive and 90% specific.[4] Recently, polymerase chain reaction (PCR) is applied for detection of both infections. With markedly improved ability to diagnose these infections, PCR provides excellent sensitivity (90-95%) and specificity (98-99%).[4]

Moreover, most studies were conducted before HIV outbreak. There is a successful outcome of HIV prevention program during the last decade, especially the success of Thai national "100% condom campaign", leading to the decrease in the prevalence of sexually transmitted disease (STD) in Thailand. Although the prevalence of overall STD has decreased, we do not know what the prevalence of gonorrheal and/or chlamydial infection in women with PID is.

According to rationale described above, this study aims to determine the prevalence of gonorrhoeal and/or chlamydial infection in women with PID by using PCR technique and to determine of factors that are associated with gonococcal and/or chlamydial infection.

Materials and Methods

The number of patients who were eligible in this study was 94 women who were hospitalized in Obstetrics and Gynecologic department, Siriraj Hospital from December 2007 to August 2008. All of them were informed and explained about the purpose and procedure of this study. The details of the research were explained and documented in the informed consent which was approved by Siriraj Ethical Committee. The informed consent was well-read, committed and signed before commencement of data collection.

All of the patients were provisionally diagnosed for the PID according to following criteria from Centers for Disease Control & Prevention (CDC) 2006.[4]

The criteria for diagnosis of PID are the sexually active women who have at least 1 major criteria and at least 1 minor criteria and must rule out other conditions. The major criteria are lower abdominal tenderness on palpation, adnexal tenderness, cervical motion tenderness. And the minor criteria are oral temperature more than 38.3^{o}C, abnormal cervical or vaginal mucopurulent discharge, presence of abundant numbers of white blood cells on saline microscopy of vaginal secretion, elevated erythrocyte sedimentation rate, elevated C-reactive protein, laboratory documentation of cervical infection with N.gonorrhoeae or C. trachomatis.

The exclusion criterion are women with history of antibiotics for any treatment in 1 month earlier or women who received antibiotic therapy for PID before collecting the cervical specimens or women who refused to participate in this study.

The patients who were included to the study were further determined for infection of N.gonorrheae and C.trachomatis by using PCR (AMPLICOR CT/NG Test).

The specimen collection was performed by using one endocervical swab to remove the mucous from the exocervix and another swab to smear the endocervix for examination, beware of touching any part of vagina. The swab was dipped into Specimen Transport Medium (STM) test tube and stalk of swab was then revolved in STM reagent for 15 minutes. Thereafter, the swab was compressed with the side of tube for removal of water as much as possible. Removed swab from the tube and tightly closed a cap of tube. After that, the specimen was immediately transported to microbiology laboratory at room temperature. If it can not be transported immediately, keep it at 4^{o}C for 7 days or -20^{o}C for 30 days before analysis.

The specimen in the transport solution of specimen transport tube (Amplicor®, Roche) were treated with a detergent solution to lyses cells and release gonococcal DNA. A second detergent

solution was then added to prepare the specimen for amplification. PCR amplification was performed using the specific biotinylated primers to define a sequence of approximately 201 nucleotides within the M·Ngo PII gene of N. gonorrhoeae and a second set of biotinylated primers that co-amplify C. trachomatis (CT) DNA in the specimen. The amplification products (amplicon) were then applied to microwell plates with target oligonucleotide probes. The hybridization process enhances the overall specificity of the test. Following the hybridization reaction, Avidin-Horseradish Peroxidase Conjugate was added to each well of the MWP. Then, 3,3',5,5'tetramethylbenzidine (TMB) and hydrogen peroxide was added to the wells forming the color complex. The reaction was stopped by the addition of a weak acid, and the optical density at 450 nm was measured using an automated microwell plate reader. The signals were finally interpreted for each sample whether GC/CT were detected.

After specimen collection, the patients were interviewed to obtain their demographic data, risk factors and any other past history which could be associated with gonorrhoeal and/or chlamydial infection. These were age, education, occupation, income, occupation of her partner, mode of contraception, presence of multiple sex partners, smoking or substances abuse, having sexual intercourse during menstrual bleeding, vaginal douching, history of previous pregnancy, previous history of PID and previous history of uterine curettage.

However, 18 women were finally excluded because of final diagnosis of acute appendicitis (7 cases), endometriosis (3 cases), ovarian cyst with complication (4 cases), urinary tract infection (2 cases), ectopic pregnancy (1 case), and gastroenteritis (1 case). Finally, there were 76 women remained for analysis. The results from findings of N.gonorrhoeae and C.trachomatis and the data from patient interview were analyzed by using the SPSS version 13. The prevalence of gonorrhoeal and/or chlamydial infection in women with PID was determined. Descriptive statistics was used to describe various clinical factors associated with these infections, using number, percentage and mean. Chi-square test were used for determining the significant of data where appropriated. Multivariable logistic regression was used to control for confounding variables and determination of the specific predictor of gonorrhoeal and/or chlamydial infection. Statistical significance was considered if p-value < 0.05.

Results

The characteristics of women with PID were shown in Table 1. Interestingly, almost half of them were under 21 years old and most of them were in low socio-economic status such as 61 women (80.2%) had completed primary or high school, and 69 women (90.8%) had income ≤ 10,000 Baht per month. However, up to 80.3% of patients did not have any previous history of PID and more than two thirds did not have history of multiple sex partners

The overall prevalence of gonorrheal and/or chlamydial infection was 35.5% as shown in Figure 1. Gonorrhoeal infection (GC) was detected for 23.7% of PID patients whereas Chlamydial infection (CT) was detected for 19.7%. Nevertheless, 33.3% of gonorrheal infected PID patients were also co-infected with C.trachomatis.

Among each demographic data, PID patients with the age group under 21 years old and those who have income less than 5,000 Baht per month appeared to associate with gonorrhoeal and/or chlamydial infections (OR = 5.00; 95%CI 1.6-15.7; p-value = 0.003 and OR = 4.1; 95%CI 1.3-13.3; p-value = 0.01, respectively) (Table 2).

For the risk factors of PID, having sexual intercourse during menstrual bleeding was found to associate with gonorrhoeal and/or chlamydial infections (OR = 4.4, 95%CI = 1.1-17.9; p-value = 0.03).

After multivariable logistic regression analysis was performed, only the patients who had income less than 5,000 Baht per month and those who had sexual intercourse during the menstrual bleeding were still statistically significant associated with

gonorrhoeal and/or chlamydial infections (AOR =3.9, 95%CI = 0.8-8.5; AOR =6.19, 95%CI = 1.42-26.9).

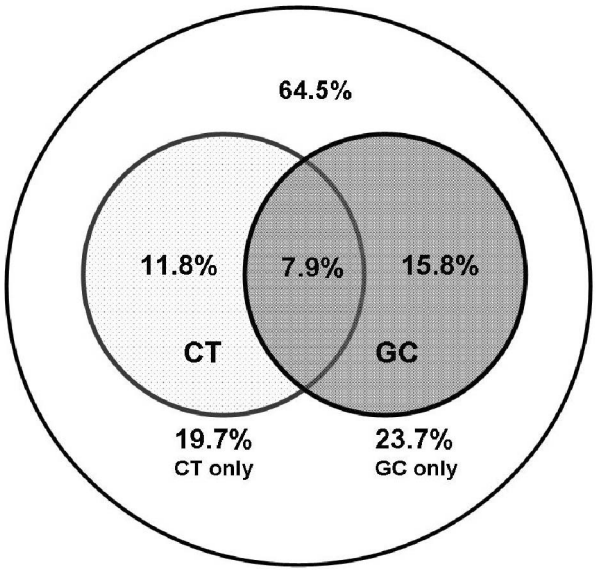

Fig. 1. The prevalence of gonococcal (GC) and/or chlamydial (CT) infection
Gonococcal infection was shown in grey circle. Chlamydial infection was shown in dot circle. The large white circle represented all PID patients.

Table 1. Baseline characteristics of women with Pelvic inflammatory disease (PID)

Characteristics	N%
Age	
Under 21 years	32 (42.1%)
21-30 years	20 (25.3%)
31-40 years	15 (19.7%)
Above 40 years	9 (11.9%)
Graduation	
Primary school	24 (31.5%)
High school	37 (48.7%)
Bachelor degree	15 (19.7%)
Occupation	
Student	25 (32.9%)
Housewife	17 (22.4%)
Employee	30 (39.5%)
Government staff	4 (5.2%)
Occupation of her partner	
Student	20 (25.3%)
Employee	41 (54.0%)
Government staff (Baht)	15 (19.7%)
Income per month (Baht)	
≤ 5,000	40 (52.6%)
5,000-10,000	29 (38.2%)
> 10,000	7 (9.2%)
Gravida	
0	38 (50.0%)
≥ 4	38 (50.0%)
Previous history of PID	
Yes	15 (19.7%)
No	61 (80.3%)
Contraception	
None	34 (44.7%)
Condom	16 (21.1%)
Oral or injected contraception	15 (19.7%)
Intrauterine device	2 (2.5%)
Tubal sterilization	9 (11.9%)
Multiple sex partners	
Yes	23 (30.3%)
No	53 (69.7%)
Smoking or substances abuse	
Yes	18 (23.7%)
No	58 (76.3%)
Coitus during menstruation period	
Yes	14 (18.4%)
No	62 (81.5%)
Vaginal douching	
Yes	18 (23.7%)
No	58 (76.3%)
Previous history of uterine curettage	
Yes	12 (15.8%)
No	64 (84.2%)

Table 2. Data associated with gonorrhoeal and/or chlamydial infection in women with PID

Characteristics	Positive N(%)	Negative N (%)	OR, (95%CI)	*P* value
Age				
Under 21 years	18 (23.7%)	14 (18.4%)	5.00, (1.6, 15.7)	0.003
21 years or more	9 (11.9%)	35 (46%)	1.00	
Graduation				
Primary school	4 (5.3%)	20 (26.3%)	1.66, (0.4, 7.1)	0.6
High school and Bachelor degree	23 (30.3%)	29 (38.1%)	1.00	
Occupation				
Student and Housewife	13 (17.1%)	13 (17.1%)	2.6, (0.9, 7.8)	0.1
Employee and Government staff	14 (18.4%)	36 (47.4%)	1.00	
Occupation of her partner				
Student	10 (13.2%)	10 (13.2%)	2.3, (0.7, 7.4)	0.2
Employee and Government staff	17 (22.3%)	39 (51.3%)	1.00	
Income per month (Baht)				
≤ 5,000	20 (26.3%)	20 (26.3%)	4.1, (1.3, 13.3)	0.01
> 5,000	7 (9.2%)	29 (38.2%)	1.00	
Gravida				
0	17 (22.3%)	21 (27.6%)	2.3, (0.8, 6.7)	0.15
≥ 1	10 (13.2%)	28 (36.9%)	1.00	
Previous history of PID				
Yes	5 (6.6%)	10 (13.2%)	0.89, (0.2, 3.3)	0.9
No	22 (28.9%)	39 (51.3%)	1.00	
Contraception				
None, IUD and Tubal sterilization	17 (22.3%)	28 (36.9%)	1.3, (0.4, 3.7)	0.8
Condom, Oral contraception pill or injection	10 (13.2%)	21 (27.6%)	1.00	
Multiple sex partners				
Yes	9 (11.9%)	14 (18.4%)	1.3, (0.4, 3.9)	0.9
No	18 (23.7%)	35 (46%)	1.00	
Smoking or substances abuse				
Yes	9 (11.9%)	9 (11.9%)	2.2, (0.7, 7.5)	0.24
No	18 (23.7%)	40 (52.5%)	1.00	
Coitus during menstruation period				
Yes	9 (11.9%)	5 (6.6%)	4.4, (1.1, 17.9)	0.03
No	18 (23.7%)	44 (57.8%)	1.00	
Vaginal douching				
Yes	8 (10.5%)	10 (13.2%)	1.6, (0.5, 5.5)	0.5
No	19 (25.0%)	39 (51.3%)	1.00	
Previous history of uterine curettage				
Yes	4 (5.3%)	8 (10.5%)	0.9, (0.2, 3.8)	1.0
No	23 (30.3%)	41 (53.9%)	1.00	

Discussion

Gonorrhoeal and/or Chlamydial infection were well recognized as sexual-transmitted organisms which is the major causative agents of PID.[5-7] In this study, the prevalence of gonorrheal and/or chlamydial infections in PID patients was 35.5% which could still be considered as a major proportion of hospitalized PID patients. We found that the prevalence of gonorrheal, chlamydial and both gonorrheal and chlamydial infection were 23.7%, 19.7% and 7.9%, respectively. Comparable to our study, Bevan C.D. et al.[6] found that 38.5% and 14.4% of acute salpingitis patients had chlamydial and gonorrheal infection respectively. A dual infection was present in eight cases (7.7%). However, a study of Jossens M.O. et al.[7] with 589 hospitalized patients with PID identified an STD organism in 65% of PID cases. N.gonorrhoeae and C.trachomatis were recovered from 324 (55%) and 129 (22%) of the patients, respectively. The importance of prompt and appropriate treatment of gonorrhoeal and chlamydial infection was also addressed to help in prevention of complications of PID.[9] Those sequelae include ectopic pregnancy, infertility and chronic pelvic pain.[9,10]

There are many factors affect to examine both organisms in this study such as the duration time of initial symptom until diagnosis because of the first stage of this disease could found only gonorrhea and chlamydia in genital tract. After that it would be polymicrobial infection. In the case of exacerbation of chronic PID, it could not found both of gonorrhea and Chlamydia.

Almost half of the young age women who were infected with N.gonorrhoeae were also infected with C.trachomatis.[8] In our study, about one thirds of gonorrheal infected PID patients had chlamydial infection. This consistent finding among gonorrheal infected PID patients implies that the prompt treatment of chlamydial infection should still be added in all patients who have gonorrheal infection. The importance of prompt and appropriate treatment of gonorrhoeal and chlamydial infection was also addressed to help in prevention of complications of PID.[9] Those sequelae include ectopic pregnancy, infertility and chronic pelvic pain.[9,10]

To identify the associating factors of gonorrhoeal and chlamydial infection, we use the associated factors which previously identified to promote PID disease include both demographical parameter and modifiable factors. Those factors include the women in adolescent age especially in 15-20 years old[11-13], poor socioeconomic status[14], previous history of PID[14], having sexual intercourse in postpartum or during menstrual bleeding[14,15], multiple partners[16], contraceptive use, such as IUD, the inflammation from the operative procedure such as uterine curettage, smoking or drugs abuse and routine vaginal douching.[14,15]

The young age, especially teenagers and women under 25 years old, are more likely to develop PID.[11-13] In this study, we found that patients with the age group under 21 years had 5 times higher risk of gonorrhoeal and/or chlamydial infection than those with age group of ≥21 years. However, there was no statistically significant association between this age group and these infections after multivariable logistic regression analysis. The increase sample size may be required to address this factor. Instead, the group with lower income (less than 5,000 Baht per month) appeared to be the important predictor. This finding does not appear to be striking as other previous studies addressed the association of socioeconomic level with PID.[4,5]

Identification of the modifiable risk factors which are associated with PID could lead to more effective education, screening and treatment of PID which may reduce the prevalence and improved quality of life in population. In our study, having sexual intercourse during menstrual bleeding could associate with gonorrhoeal and/or chlamydial infection. This factor was also mentioned in previous studies[15,17], thus addressing the impact of education on this issue for prevention of PID is essential.

The bottom line issue on our study is that the

population of gonorrhoeal and/or chlamydial infection group was determined for its associated risk factors. Therefore, we could select for the appropriate group of PID patients that antibiotics covering these organisms should be given. The further management that should be addressed is the treatment of partners of those patients in order to prevent the recurrence of infection.[4] This approach could be more beneficial whenever the detection of both organisms is not available. Early management could lead to reduction of complication due to PID disease.

However, only 76 PID women were included in this study. The further study on the larger sample size and longer duration should be performed in order to identify the other possible associating factors.

In conclusion, our study re-addressed that gonorrhoeal and/or chlamydial infection is the common organisms of PID. The prompt treatment of both infections should be performed as its co-infection is common. The associating factors which could predict gonorrhoeal and/or chlamydial infection are PID patients who have low socioeconomic status and those who have sexual intercourse during menstrual bleeding.

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ความชุกของการติดเชื้อโกโนเรียและ/หรือคลาไมเดีย ในสตรีที่นอนรักษาตัวในโรงพยาบาลเนื่องจากเป็นโรคอักเสบติดเชื้อในอุ้งเชิงกราน

เสฐียรพงศ์ จารุสินธนากร, อัมพัน เฉลิมโชคเจริญกิจ

วัตถุประสงค์ *: เพื่อค้นหาความชุกของการติดเชื้อโกโนเรียและ/หรือคลาไมเดียในสตรีที่เป็นโรคอักเสบติดเชื้อในอุ้งเชิงกราน ตลอดจนศึกษาว่ามีปัจจัยใดบ้างที่มีความสัมพันธ์กับการติดเชื้อชนิดใดชนิดหนึ่งหรือทั้งสองชนิดนี้ในสตรีกลุ่มนี้*

รูปแบบการวิจัย *: การวิจัยชนิด cross-sectional study*

สถานที่ทำการศึกษา *: ภาควิชาสูติศาสตร์-นรีเวชวิทยา คณะแพทยศาสตร์ศิริราชพยาบาล*

วัสดุ *: กลุ่มศึกษาคือผู้ป่วยสตรีจำนวน 76 ราย ที่มารับการรักษาตัวในโรงพยาบาลศิริราชและได้รับการวินิจฉัยว่าเป็นโรคอักเสบติดเชื้อในอุ้งเชิงกราน ในช่วงระหว่างเดือน ธันวาคม พ.ศ.2550 ถึง สิงหาคม พ.ศ.2551*

วิธีการ *: เก็บสารคัดหลั่งจาก endocervical canal ในกลุ่มศึกษา เพื่อส่งตรวจหาเชื้อโกโนเรียและคลาไมเดีย ด้วยวิธี polymerase chain reaction ร่วมกับ เก็บข้อมูลพื้นฐานของผู้ป่วยกลุ่มนี้ในแบบบันทึกข้อมูลที่จัดทำขึ้น เพื่อศึกษาว่ามีปัจจัยใดบ้างที่มีความสัมพันธ์กับการติดเชื้อชนิดใดชนิดหนึ่งหรือทั้งสองชนิดนี้*

ผลการศึกษา : พบความชุกของการติดเชื้อโกโนเรียและ/หรือคลาไมเดียในสตรีที่เป็นโรคอักเสบติดเชื้อในอุ้งเชิงกราน ถึงร้อยละ 35.5 โดยพบการติดเชื้อโกโนเรียร้อยละ 23.7, เชื้อคลาไมเดียร้อยละ 19.7 พบว่าร้อยละ 33.3 ของผู้ป่วยสตรีที่ติดเชื้อโกโนเรียจะมีการติดเชื้อคลาไมเดียร่วมด้วย พบว่าปัจจัยที่มีความสัมพันธ์กับการติดเชื้อชนิดใดชนิดหนึ่งหรือทั้งสองชนิดนี้ ได้แก่ กลุ่มที่มีรายได้น้อยกว่า 5,000 บาทต่อเดือน (AOR = 3.9, 95%CI =1.03-14.86, P = 0.045) และสตรีที่มีประวัติมีเพศสัมพันธ์ในขณะที่มีประจำเดือนก่อนหน้านี้ (AOR = 6.19, 95%CI =1.42-26.9, P = 0.015)

สรุป *: ประมาณ 1 ใน 3 ของผู้ป่วยสตรีที่เป็นโรคอักเสบติดเชื้อในอุ้งเชิงกราน พบว่ามีการติดเชื้อโกโนเรีย และ/หรือ คลาไมเดีย ควรตรวจติดตามเชื้อทั้งสองชนิดนี้ในผู้ป่วยกลุ่มที่มีความเสี่ยงสูง โดยเฉพาะอย่างยิ่งในกลุ่มสตรีที่มีรายได้น้อยกว่า 5,000 บาทต่อเดือน หรือมีประวัติมีเพศสัมพันธ์ในขณะที่มีประจำเดือนก่อนหน้าเกิดโรคนี้*