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Factors associated with Pelvic Inflammatory Disease among Women Attending the Gynecology Clinic at Kampala International University Teaching Hospital, Uganda.

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ABSTRACT

Pelvic inflammatory disease (PID) is major health problem in developed and developing country involving more young women. It is associated with high rate of female reproductive health morbidity; it can complicate with ectopic pregnancy, infertility and chronic pelvic pain. A poor response therapy increases the likelihood of these complications; this could be due to an increase in antimicrobial resistant pathogens. The aim of this research was to identify factors that are associated with PID at Kampala International University Teaching Hospital. This was a cross-sectional study conducted among women who attended gynecology clinic at Kampala International University Teaching Hospital. Consecutive enrolment of 324 participants who consented to participate was done daily until a required sample size was realized from November 2019 to January 2020. Structured questionnaires were used to collect data on associated factors; endocervical swab was taken from patient clinically diagnosed with PID. Culturing for colony characteristics followed by Gram stain was used for provisional identity of pathogenic bacteria. Further identification was done by a set of biochemical tests. Data was analyzed using STATA VERSION 14.2. Not being educated, having two or more sexual partners, previous history of PID and induced abortion, also the previous use of contraceptives specifically the use of IUD ,were all significantly associated with Pelvic inflammatory disease (P value <0.05). The significant risk factors were not being educated, having previous history of PID, have ever use IUD as a family planning method and undergoing any intrauterine procedure.

Keywords: Pelvic inflammatory disease, Gynecology and infertility.

INTRODUCTION

Factors associated with pelvic inflammatory disease

Factors associated with pelvic inflammatory disease, can be used to initiate timely, effective intervention, and help formulating health education strategies. The factors for pelvic inflammatory disease development are closely associated with those of sexually transmitted infection acquisition [1]. Different studies have linked a wide range of interrelated factors (direct causal association)/or markers (indirect relation) to the acquisition of pelvic inflammatory disease. The presence of a sexually transmitted infection and the use of intrauterine contraceptive devices (IUCDs) have been consistently reported as risk factors, whereas previous pelvic inflammatory disease, previous gonorrhea, young age, and multiple sexual partners have been reported as risk markers [2]. In this study, the socio demographic factors, the gynecological related factors and the sexual behavior of the study participant will be considered in their relation with occurrence of pelvic inflammatory disease.

Socio demographic factors

Socio-demographics are group related characteristics defined by sociological and demographic characteristics. These include age, race, ethnicity, religion, and language and education level among

others. It also includes socio-economic status [3]. For this study, the socio-demographic factors refer to age, education level, income level, marital status, occupation and tribe. Younger age has been associated with increased risk of pelvic inflammatory disease there are reasons explaining this association, among them, cervical mucosal permeability, a larger zone of cervical ectopy and increased risky behaviors [4]; the diagnosis is made three times more often in sexually active teens than in young women aged 25 to 29. Initiation of intercourse at age of 15 years results in one in eight chance of acquiring pelvic inflammatory disease [5]. [7] in the study done on Assessment of risk for pelvic inflammatory disease in an urban sexual health population in Sydney, showed that women below the age of 25years were at considerable risk of developing pelvic inflammatory disease, for those aged 15-19 were 5 fold higher risk of pelvic inflammatory disease and those above 30 were less likely to develop pelvic inflammatory disease and for those aged 39 and above had 0.3 risk of pelvic inflammatory disease [2]. Kreisel et al (2014), in the study on prevalence of pelvic inflammatory disease among sexually experienced women in USA showed also a prevalence of self-reported lifetime PID among women who became sexually active before 12 years was approximately eight times high compare to that of women whose age of sexual activity was ≥18 years (OR = 8.6) [7]. [8], in the study based on Pelvic inflammatory disease and risk factors in India, found that 35.3% of their participants who had pelvic inflammatory disease were illiterate, with 10% graduates. It was therefore suggested that educated women were better prepared to deal with the disease compared to others. The same authors also reported that the association of socioeconomic status with the incidence of pelvic inflammatory disease was as well established by WHO where it was shown that the possibility of accessibility to better hygiene in the higher socioeconomic groups is probably the reason of lesser incidence of PID as compared to the lower categories. [9] in his study on prevalence and determinants of *Neisseria Gonorrhea* and *Chlamydia Trachomatis* Infections in Patients with Pelvic Inflammatory Disease at Lusaka, he recruited 116 participants with pelvic inflammatory disease, women without education accounted for 42.8% followed by those who had secondary education accounting for 37.9% among respondents, 36.4 % had gonorrhea isolated while this was isolated in 38.9% accounted for those of primary education level. This author again reported that 59.8% of participants had net income less than 1,000, 000 of Zambian Kwacha, in this group also 58.5% of respondents accounted for gonorrhea isolation; thus supporting report that low income groups are at a high risk of having a sexually transmitted infection related to pelvic inflammatory disease. The same author reported no significant difference in prevalence of pelvic inflammatory disease between single women and married women, where single women accounted for 45.7% and 54.3% were married and among the single women, 37.8% were found to have gonorrhea while 36.5 % of the married women had gonorrhea.

Gynecological related factors

A number of gynecological factors have been associated with pelvic inflammatory disease such as intrauterine device; endometrial biopsy and termination of pregnancy have been associated with iatrogenic pelvic inflammatory disease. This occurs when instrumentation facilitates the introduction of vaginal and cervical micro-organisms into the endometrial cavity [10]. In this study, gynecological factors refer to parity, previous history of PID, previous history of abortion, history of intrauterine manipulation and the use or not using contraceptive methods. The association between PID and oral contraceptive (OC) use is complex and incompletely understood, although oral contraceptive use has been associated with a 50% decrease in PID cases as reported in studies by [7]. According to [4], there are different theories concerning oral contraceptive use and pelvic

inflammatory disease. On one hand authors support that oral contraceptive increase the risk of endocervical infection by increasing the zone of cervical ectopy; while on the other hand there is evidence indicating that oral contraceptives decrease the risk of symptomatic PID by increasing cervical mucus viscosity, decreasing menstrual flow and by modifying and increasing local immune responses. Also when consistently used, the barrier methods are associated with decreased incidence of pelvic inflammatory disease. [6] in the study in Sydney on assessment of risk for pelvic inflammatory disease sexual health in urban population, they reported that contraceptive history, the use of intrauterine contraceptive device, use of condoms, and not using contraception were each associated with an increased risk of PID. However, intrauterine contraceptive device use carried the great risk for PID (OR 4.5 (95% CI 2.14–9.39). It was also found that previous history of pelvic inflammatory disease carried a very high risk for the development of subsequent pelvic inflammatory disease (OR 5.9 (95%CI 3.59–9.73). [11] in the study on determinant of PID in Zambia reported that out of 116 patients enrolled in the study 70.7% were not using any form of family planning, of them 37.9% had gonorrhea infection and 17% were using Jadelle, 3.8% were found with *Chlamydia trachomatis*, 5.4% reported using IUD and among them 50% were found with gonorrheal PID, 8.6% of respondents reports using condoms but among them 50% were found with gonorrhea which was explained by its inconsistent use. The author report no significant difference among multiparous and nulliparous concerning gonorrheal isolation but pelvic inflammatory disease was more diagnosed in 57.8% of those who had ever delivered before which was higher than in those who had not yet delivered where they accounted for 33%. The above literature shows different gynecological factors influencing the occurrence of pelvic inflammatory disease and this with different patterns in different countries, this study will find out the predominant gynecological among the study participant in Uganda.

Sexual behavior factors

Risk factors for pelvic inflammatory disease development are closely associated with those of sexually transmitted infection (STI) acquisition. Aspects of sexual behavior, such as age at first sexual intercourse, number of lifetime sexual partners, frequency of partner change, and unsafe sex are key determinants of STI transmission [2]. Age at first sexual intercourse and the number of lifetime sexual partners are known to vary with marital status, cohabitation, and socioeconomic status. The relation between pelvic inflammatory disease and socioeconomic status is likely to be a surrogate marker of sexual behavior. Young people are behaviorally vulnerable to sexually transmitted infection acquisition because they are likely to be more sexually active and have more sexual partners [7]. [11] in his study on prevalence and determinants of *Neisseria Gonorrhea* and *Chlamydia Trachomatis* infections in patients with pelvic inflammatory disease in Lusaka, Zambia, among all the participants, those with pelvic inflammatory disease, 98.3% of them had at least one sexual partner and 37.7% was found to have gonorrhea, while 1.7% that reported having no sexual partner no gonorrhea was isolated from their group, 16.7% of all the respondents had new sexual partners in the six months previous to the study. All the respondents who had two or three new sexual partners had gonorrhea; 40.7 % of all the respondents thought their steady sexual partner who had another sexual partner(s), of these 30.4% had gonorrhea isolated from their samples, and the mean age of initiation of sexual activity was 18±5.5years. the author also reported that pelvic inflammatory disease with gonorrhea isolation was more observed in women who had three or more sexual intercourse per week with 49.6% as compared to those who had less than this frequency per week who accounted for 17.2% [11]. [12] in the study on intravaginal practices , vaginal flora disturbence and acquisition of pelvic

inflammatory in Zimbabwe showed that douching with herbal solutions was associated with disturbance of normal vaginal flora and increased in sexually transmitted infection and pelvic inflammatory disease. In Uganda the few studies conducted about pelvic inflammatory disease have not described the sexual behavior of the study participants. This study will try fill this gap by determining the sexual behavior of these patients and how this behavior influence the occurrence of pelvic inflammatory disease.

Aim of the study

To identify factors associated with PID among women of reproductive age presenting at Kampala International University Teaching Hospital.

Specific objective

To determine the factors associated with pelvic inflammatory disease among women attending gynecology clinic at Kampala International University Teaching Hospital.

Research question

What are the factors associated with pelvic inflammatory disease among women attending Kampala International University Teaching Hospital?

METHODOLOGY

Study design

This was a cross sectional study. Laboratory investigations was done to achieve the prevalence pattern in women with pelvic inflammatory disease attending gynecology clinic at Kampala international university teaching hospital. Association between PID and different factors was established.

Study area

The study was conducted at Kampala International University Teaching Hospital found in Ishaka Bushenyi Municipality at approximately 60km from Mbarara town along Mbarara Kasese highway. The study population were coming from the districts of Bushenyi, Rubirizi, Sheema, and Mitooma as well as from the nearby districts.

Study site

The study was conducted in the gynecological outpatient clinic in the department of obstetrics and gynecology. The department runs daily from Monday to Friday and receives an average of 20 patients of which 25% are diagnosed with pelvic inflammatory disease. It is run by specialists, residents, intern doctors and midwives. The main laboratory of KIU-TH has a microbiology section which is well equipped and staffed to carry out culture and sensitivity as well as other microbiological tests like growth and isolation of several microorganisms. The equipment that helps to perform different exams within the microbiology laboratory in this hospital includes incubator, microscope, hot air oven, refrigerator, autoclave, and safety cabinet and gas cylinder. It is also well facilitated with enough stains which help in identifying different microorganisms.

Study population

The study populations were all women of reproductive age in the catchment area

Target population

All women of reproductive age attending gynecology clinic at Kampala international university teaching hospital shall be considered for inclusion in this study.

Accessible population

All women of reproductive age attending gynecology clinic who meet the inclusion criteria of the study

Selection criteria

Inclusion criteria

All the women at the reproductive age attending gynecology clinic of Kampala international university teaching hospital as well as emancipated minors.

Exclusion criteria

Women on antibiotics, pregnant women, unconscious patients who cannot consent and minors were excluded from the study.

Sample size determination

$$n = \frac{(1+r)^2\,[Z_\alpha + Z_\beta]^2}{r\,(lnOR)^2 x\, p(1-p)}$$

$$\frac{(1+3.6)2 \times (1.96+0.84)2}{3.6(\ln 5.9)2 \times 0.131(1-0.131)}$$

$n_3=118$

Sampling technique

Consecutive sampling method was used to select participants who consented to be part of the study. All the women of reproductive age who met the inclusion criteria was invited to participate in the study, the participants was enrolled according to their order of arrival in gynecology clinic and this was carried out on a daily basis until the required sample size was achieved.

Data collection instruments

A pretested questionnaire was administered to each participant who consented to participate to the study in order to collect information on socio-demographic, gynecological and sexual behavior factors that related to the development of pelvic inflammatory disease in. A detailed history was taken in English, translated in local language where necessary for women who could not understand English physical examination was carried out and the endocervical sample was taken from patient with symptoms and of PID in order to achieve all the objectives.

Study procedure

History taking:

Women of reproductive age who attended gynecology clinic of Kampala international university teaching hospital were informed about the study, a written consent were sought then, and demographic data were inquired. Their chief complaints were taken and detailed history to look for symptoms and risk factors of developing pelvic inflammatory disease.

Physical examination and sample collection

Patient were counseled for the examination a written consent was sought and signed then a physical examination for features of pelvic inflammatory disease which are; lower abdominal tenderness, adnexal tenderness and cervical motion tenderness. The patient were put on examination bed in lithotomy position, vulva was inspected for the presence of any discharge, A sterile speculum was inserted to look for the presence of cervical discharge. During this time a sterile swab stick was used, to collect the endocervical sample, the sterile swab was inserted in the endocervical canal 20 to 30 millimeters and rotated at 360^0 on the endocervical walls, immediately swab was put in the amies transport medium to ensure the possibility of capturing all the bacteria [13]. This sample was collected by the principle investigator in the presence of a female nurse as a research assistant, it was labeled with patient`s serial number and taken to the laboratory by the research assistant for immediate analysis of the specimen. The patient was given treatment according to Uganda clinical guideline as the researcher continued to follow up the result in the laboratory for a period of 72 hours. Laparoscopy is not going to be considered since it is not available in the research setting.

Sample processing and analysis

Isolation

Samples collected using a sterile procedure with the endocervical swab stick was inoculated on blood agar, chocolate agar, Mac Conkey agar, Thayer

Martin medium, and different biochemical tests were used. After, they were incubated both aerobically and anaerobically at 37^{o}C for 24-48hrs. Colony morphology were observed according to shape, size, elevation, margin and surface characteristics. Rapid diagnostic test was used in order to identify the *Chlamydia trachomatis* antibody careers within the endocervical sample of the participants, the isolation of Chlamydia which uses living cells (McCoy cell) was not done due lack of this specific media to culture *Chlamydia trachomatis,* this rapid Chlamydia test was used to determine the percentage of Chlamydia carriers among the patient with pelvic inflammatory disease.

Data analysis plan

Data from questionnaires were entered in Microsoft Excel 2010, and thereafter exported to STATA 14.1. Socio-demographic, sexual behaviors and gynecologic factors were summarized as means and mediams, standard deviations and interquartile range (for continuous variables) were determined. Proportions, percentages and frequencies were used for categorical variables using STATA 14.1.

Ethical considerations

Informed consent:

Informed consent and respect for participant's voluntary recruitment was observed. Informed consent for participants were obtained and signed after fully explaining the details of the study to them in English and local languages where necessary (copy attached at Appendix). Participants were not forced to enroll themselves if they don't want to, they were free to withdraw from the study any time they wish without coercion or compromise of care they are entitled to.

Risks and adverse events to study participants

Patients may undergo pain during swabbing and speculum examination, however, the process of obtaining a swab was done gently and professionally to minimize risk of pain and minimize re-infection as far as possible. Additionally, culture and sensitivity are the recommended guidelines prior to antibiotic therapy to minimize the risk of antibiotic resistance.

Benefits of the research

The community benefited from dissemination of findings on the most active antibiotic that should be prescribed to these patients at KIU-TH. Such finding has significant role in contributing to reduction of mortality and morbidity due to PID.

Privacy and confidentiality

Identification of participants was by means of numerical codes. Details of respondents were kept confidential for privacy purpose throughout the course of research. Respect of the respondents' rights and fair treatment were strictly adhered to thus minimizing harm and discomfort to them. There was no disclosure of participant's information to the public without their consent; the endocervical swab was collected in presence of a female nurse as a research assistant with the agreement of the participant.

Factors associated with pelvic inflammatory disease were analyzed by both bivariate and multivariate logistic regression analysis. Variable that are biologically plausible and those with p-value < 0.05 will be considered for multivariate analysis. The variables in the final multivariate model were significant when p-value ≤ 0.05. The measure of association was reported as odds ratios (ORs) with corresponding 95% CI and p-values. All statistical analysis was carried out in STATA 14.1 (Statacorp, lakeway Drive, USA Texas).

RESULTS

Table 1: Socio demographic factors

Characteristics	Frequency	%
Age (years)		
<20	31	9.6
20-29	205	63.3
30-39	71	22.0
40-49	17	5.1
Education		
None	11	3.4
Primary	99	30.6
Secondary	111	34.4
Tertiary	103	31.6
Occupation		
None	127	39.2
Farmer	85	26.2
Professionals	51	15.7
Business	31	9.6
Manual laborer	30	2.3
Monthly income (UGX)		
None	10	3.1
<300000	230	71.8
300000-600000	66	26.5
>600.000	18	5.6
Marital status		
Single	86	26.5
Married	238	73.5

The above table illustrates that 63.3% of participants are aged of 20-29 years, 34.4% have secondary education, 39.2% have no occupation, 71.8% of participants have a monthly income of less than 300.000 Uganda Shillings and 73.5% are married.

Table 2 Gynecological factors

Characteristics	Frequency	%
Parity		
Zero	98	30.3
1-3	153	47.2
>3	73	22.5
Had PID before		
No	224	69.1
Yes	100	30.9
Had miscarriage before		
No	264	81.5
Yes	60	18.5
Use Contraceptive		
No	132	40.7
Yes	192	59.3
Intra Uterine Procedure		
No	281	86.7
Yes	43	13.3
Type contraception		
Condoms	38	19.8
Pills	61	31.8
Injectables	65	33.8
IUD	28	14.6
Type of miscarriage		
Spontaneous	41	68.3
Induced	19	31.7

From the above table, 47.2% of the study participants had delivered at least one to three times, 69.1% had had miscarriage of which 68.3% were spontaneous, 59.3% of the study participants had ever used contraceptive methods of which 33.6% had used injectable contraceptive methods and 86.7% had not had intrauterine procedures.

Table 3: Sexual behavior factors

Characteristics	Frequency	Percent
Number of of sexual partners		
None	20	6.2
One	253	78.0
More than one	51	15.8
Age of initiation sexual activity(year)		
< 15	25	7.7
16-20	242	74.7
>20	57	17.6
Condom Use		
Sometimes	84	25.9
Every time	38	11.8
Never	202	62.3
Smoking		
Never smoke	316	97.5
Ever smoke	8	2.5

The above table shows that, the age of initiation of sexual activity for the majority of participants was 16-20years in 74.7%, most of the study participants denied the use of condoms with 62.3% and 97.5% were nonsmokers.

Factors associated with Pelvic inflammatory disease

Table 4: Bivariate analysis of socio demographic factors associated with PID among women attending gynecology clinic at KIU-TH

Variable	No PID	PID	cOR(C95%CI)	P
Age(years)				
<20	24(77.4)	7(22.6)	1.8(0.70-4.48)	0.228
20-29	176(85.9)	29(14.2)	1.0	
30-39	52(73.2)	19(26.8)	2.2(1.15-4.27)	**0.017**
40-49	10(58.8)	7(41.1)	4.2(0.11-0.24)	**0.007**
Occupation				
None	100(78.40)	27(21.2)	3.1(1.04-9.59)	0.141
Farmer	66(77.7)	19(22.4)	3.38(1.08-10.59)	0.236
Professionals	47(92.1)	4(7.8)	1.0	
Business	24(77.4)	7(22.6)	3.4(0.91-12.87)	0.068
Manual laborer	25(83.3)	5(16.7)	2.35(0.57-9.54)	0.232
Monthly income				
None	9(90)	1(10)	1.0	
<500000	181(78.7)	49(21.3)	2.4(0.30-19.70)	0.404
500000-1000000	58(87.9)	8(12.1)	1.2(0.13-11.13)	0.847
>1000000	14(77.9)	4(19.1)	2.5(0.24-26-85)	0.430
Education				
None	6(54.6)	5(45.5)	4.8(1.32-18.06)	**0.017**
Primary	84(84.9)	15(15.1)	1.0(0.48-2.27)	0.906
Secondary	84(75.7)	27(24.3)	1.8(0.93-3.79)	0.075
Tertiary	88(85.4)	15(14.6)	1.0	
Marital status				
Single	65(75.6)	21(24.4)	1.5(0.85-2.81)	0.326
Ever married	197(82.8)	41(17.23)	1.0	

Independent socio-demographic factors with p-values ≤ 0.05 were considered to have a profound influence for the development of PID among patient attending gynecology clinic at KIU-TH and were considered in the multivariate model. These included the level of education and age.

Table 5: Bivariate analysis for sexual behavior factors associated with PID among women attending gynecology clinic at KIU-TH.

Variable	No PID	PID	cOR(CI 95%)	P
Number of sexual partners				
None	18(90)	2(10)	1.0	
One	214(84.6)	39(15.4)	1.6(0.36-7.35)	0.518
Two & more	30(58.9)	21(41.1)	6.3(1.31-30.09)	**0.021**
Age of initiation of sexual activity				0.089
<15	20(80)	5(20)	2.6(0.67-9.960	0.163
15-20	190(78.5)	52(21.5)	2.8(1.08-7.49)	**0.034**
>20	52(91.2)	5(8.8)	1.0	
Use of Condom				0.267
Sometimes	58(73.4)	21(26.6)	0.3(0.10-1.41)	0.132
Every time	35(92.1)	3(10.7)	1.0	
Never	169(816)	38(18.3)	0.7(0.39-0.590	0.302
Smoking				0.0669
No	256(81.0)	60(19)	1.0	
Yes	6(75)	2(25)	1.4(0.28-7.22)	0.671

The number of sexual partners and age of initiation of sexual activity show to have profound influence for the development of PID, with P< 0.05 and were considered for multivariate analysis.

Table 6: Bivariate analysis for Gynecological related factors associated with PID among women attending gynecology clinic at KIU-TH.

Variable	No PID	PID	cOR (95%CI)	P
Parity				0.644
Zero	77(78.6)	21(21.4)	**1.0**	
One to three	127(83.0)	26(17)	0.7(0.39-1.42)	0.380
More than three	58(79.6)	15(20.6)	0.9(0.45-1.99)	0.889
Hx of PID				
No	215(96)	9(4.02)	**1.0**	
Yes	47(47)	53(53)	26.9(12.42-58.40)	**<0.001**
Hx of Miscarriage				
No	224(84.9)	40(15.2)	**1.0**	
Yes	38(63.3)	22(36.7)	3.24(1.73-6.040	**<0.001**
Contraceptive use				
No	119(90.1)	13(9.9)	**1.0**	
Yes	143(74.5)	49(25.5)	3.1(1.62-6.05)	
Intrauterine Procedure				
No	244(86.8)	37(13.2)	**1.0**	
Yes	18(41.9)	25(58.1)	9.1(4.56-18.40)	**<0.001**
Type of Contraception				
Condom	31(81.6)	7(18.4)	1.0	
Pills	48(78.7)	13(21.3))	0.9(0.81-1.23)	0.193
Injectables	48(73.8)	17(26.1)	0.7(0.92-3.02)	0.342
IUD	16(57.1)	12(42.9))	4.2(1.70-19.42)	**0.023**
Type of miscarriage				
Spontaneous	36(87.8)	5(12.1)	**1.0**	
Induced	10(52.6)	9(47.3)	3.8(1.80-6.43)	**0.026**

Table above shows that gynecological related factors that include previous history of PID, previous miscarriage specifically induced miscarriage, contraceptive use especially having the use of intrauterine device and undergoing intrauterine procedure indicated a p-value less than 0.05 and profoundly influence PID, these factors were then considered for multivariate analysis.

Results of multivariate analysis for factors influencing Pelvic inflammatory disease

Table 7: Multivariate analysis for factors influencing PID among women attending gynecology clinic at KIU-TH.

Variables	aOR (95%CI)	P
Age(years)		
<20	1.4(0.40-4.30)	0.588
20-29	1.0	
30-39	1.7(0.69-5.15)	0.235
40-49	1.1(0.26-515)	0.832
Education		
None	7.4(1.11-49.61)	0.039
Primary	0.9(0.31-2.37)	0.772
Secondary	1.1(0.46-3.00)	0.73
Tertiary	1.0	
Num of sex part		
None	1.0	
One	0.4(0.77-2.47)	0.349
Two & more	2.3(0.83-5.75)	0.049
History of PID		
No	1.0	
Yes	17.1(7.20-40.95)	0.0001
Contraceptive use		
No	1.0	
Yes	2.4(1.01-6.10)	0.046
Intrauterine Procedure		
No	1.0	
Yes	3.03(1.24-7.37)	0.014
Type of contraception		
Condom	1.0	
Pills	0.5(0.28-1.61	0.423
Injectables	0.9(0.81-2.01	0.259
IUD	3.2(1.53-6.42)	0.018
Type of miscarriage		
Spontaneous	1.0	
Induced	2.6(1.46-4.98)	0.032

In multivariate analysis the factors that were significantly and independently associated with PID were having no education, having history of PID, history of ever use contraception and specifically IUD, history of inducing a miscarriage and undergoing intrauterine procedure.

The odds of having PID were 7.4 times higher among women with without education compare to those with tertiary level of education after adjusting for other factors in the multivariate model and this were significant, OR=7.4, 95%CI:I.11-49.6 P<0.039

The odds of having PID were 17.1 times higher among women with history of PID as compare to without history of PID in multivariate model after adjusting with other factors it was significant, OR=17.1, 95% CI:7.2-40.9 P<0.001. Odds of having PID for women who have used contraceptive is 2.4 times higher than those who have not used OR=2.4 95% CI:1.06-6.10 P=0.014 , this is more observed in women who have an IUD inserted than those who have condom this is significant with; OR=3.2, 95%CI:1.53-6.42 P=0.018; the Odds of having PID is 2.6 times higher for women who have had a induced miscarriage as compare to those who have had a spontaneous miscarriage, this is also significant with OR=2.6 95% CI:1.46-4.98 P=0.032.

The odds of having PID were 2.3 times higher for women with two or more sexual partners as compare to those without sexual partners, this is significant with OR =2.3 95%CI 0.83-5.75 P=0.049.

DISCUSSION

Factors associated with Pelvic inflammatory disease

This study established that level of education, previous history of pelvic inflammatory disease, the use of family planning methods, intrauterine procedure, and the number of sexual partners and having an induced abortion were the significant factors influencing the development of pelvic inflammatory disease among women attending the outpatient gynecology clinic at KIU Teaching Hospital. In this study, not being educated aOR=7.4 95%CI 1.11-49.61 P=0.039 showed a great risk of developing PID as compare to those with tertiary education, this finding was also reported by other researchers, [8], in the study based on Pelvic inflammatory disease and risk factors in India, found that 35.3% of their participants who had pelvic inflammatory disease were illiterate, the lower awareness of hygienic measures and protection against sexually transmitted infection could be the explanation of this finding.

In this study, women who reported having two or more sexual partners were 2.6 times more likely to have PID as compare to those without sexual partner, aOR=2.6 95CI0.86-5.75 P=0.049, this findings were reported by other researches. [11] in his study on prevalence and determinants of *Neisseria Gonorrhea* and *Chlamydia Trachomatis* infections in patients with pelvic inflammatory disease in Zambia observed that among all the participants, those with pelvic inflammatory disease, 98.3% of them had at least one sexual partner and 37.7% was found to have gonorrhea, while 1.7% that reported having no sexual partner no gonorrhea was isolated from their group, 16.7% of all the respondents had new sexual partners in the six months previous to the study. All the respondents who had two or three new sexual partners had PID and were found to have gonorrhea in 40.7 %. [11]

Previous history of pelvic inflammatory disease was a great risk of acquiring a new episode of PID (aOR=17.1 95% CI 7.2-40.1 P<0.001), women with previous history of PID are 17 time likely to develop subsequent PID compare to without history of PID, previous history of PID is believed to impaired local immunity and increased the likelihood of acquired PID. Intracellular Chlamydia trachomatis does not cause an acute infammatory response and little direct permanent damage results from chlamydial tubal involvement. However, cell-mediated immune mechanisms may be responsible or subsequent tissue injury. Specifically, persistent chlamydial antigens can trigger a delayed hypersensitivity reaction with continued tubal scarring and destruction [14]

The use of contraceptive is associated with increased risk of PID in this research with aOR=2.4 95%CI1.01-7.37 P=0.04). This finding has also been reported in other international journals, [6] in the study done in Sydney on assessment of risk for pelvic inflammatory disease and sexual health in urban population, they reported that contraceptive history, the use of intrauterine contraceptive device, use of condoms, and not using contraception were each associated with an increased risk of PID, however intrauterine contraceptive device use carried the great risk for PID (OR 4.5 (95% CI 2.14–9.39). this could be explain by the fact that contraceptives offer more of protection against pregnancy and need to be supplemented with a consistent use of barrier methods to also protect against STIs and other ascendant infections.

In this study, it is shown that to undergo any intrauterine procedure (curettage, HSG, IUD insertion and curettage) carries a risk of pelvic inflammatory disease (aOR =9.2 95% CI 1.70-19.42 P=0.032). PID being caused in most cases by the ascendant infection from the lower to the upper genital tract, any intrauterine manipulation may directly facilitate the ascension of these microorganisms, this finding has been also reported in several

researches, [8] in Pakistan found that women with PID were 3.8 times more likely to be ever users of IUD (O.R=3.8, 95% C.I=2.0-7.2) and almost pills/condoms/other (O.R=1.5, 95% C.I=0.7-3.2).

CONCLUSION

The significant risk factors were not being educated, having previous history of PID, have ever use IUD as a family planning method and undergoing any intrauterine procedure.

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