Relationship between Female Infertility and Pelvic Inflammatory Disease

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ABSTRACT

Background: Infertility is a worldwide health problem among couples with approximately 15% current global infertility rate, translating to one in 6 couples suffering from this condition. The aim of the present study was to find the relation between infertility and pelvic inflammatory disease. Patients and methods: A cross-sectional case series study included 191 infertile women selected from the Outpatient Clinics of the Obstetrics and Gynecology Department, Faculty of Medicine, Zagazig University Hospitals. All women underwent general examination, local speculum examination, and abdominopelvic ultrasound. Also, we collected the data about past reports of all investigations, U/S, laparoscopic and HSG reports done during their journey on infertility assessment. Results: There was statistically significant difference between positive and negative PID patient's parity and social class. But regarding other variables, there was no statistically significant difference. There was statistically significant difference between positive and negative PID patients regarding methods of contraception, repeated history of PID and hospitalization due to PID. But regarding other variables, there was no statistically significant difference. There was statistically significant difference between positive and negative PID patients regarding WBCs and bacteruria. But regarding other variables, there was no statistically significant difference. There was statistically significant difference between positive and negative PID patients regarding using IUD as contraception. But regarding others, there was no statistically significant difference. Conclusion: Observed treatment of PID should be initiated in sexually active young women and others at risk for STIs if the following minimum criteria are present and no other cause(s) for the illness can be identified: lower abdominal tenderness or adnexal tenderness or cervical motion tenderness.

Keywords: Infertility; Pelvic Inflammatory Disease; Bacteruria

INTRODUCTION

Infertility is generally defined as one year of unprotected intercourse without conception (**1).** To understand age-related infertility further, it is important to understand that unlike males, every woman has her lifetime complement of eggs at birth. Women with age related infertility wishing to conceive with their own eggs should consider using Pre-implantation Genetic Screening (PGS) with IVF treatment. PGS can test embryos for chromosomal abnormalities before they are implanted into the uterus **(2)**.

Prospective patients should note that reproductive endocrinology and infertility medical practices do not see women for general maternity care. The practice is primarily focused on helping their patients to conceive and to correct any issues related to recurring pregnancy loss **(3)**.

Fertility does not ultimately cease before menopause, but it starts declining after age 27 and drops at a somewhat greater rate after age 35. Women whose biological mothers had unusual or abnormal issues related to conceiving may be at particular risk for some conditions, such as premature menopause, that can be mitigated by not delaying parenthood **(4)**.

Pelvic inflammatory disease (PID) is initiated by infection that ascends from the vagina and cervix into the upper genital tract. *Chlamydia trachomatis* is the predominant sexually transmitted organism associated with PID. Other organisms implicated in the pathogenesis of PID include *Neisseria gonorrhoeae*, *Gardnerella vaginalis*, *Haemophilus influenzae*, and anaerobes such as *Peptococcus* and *Bacteroides* species. Laparoscopic studies have shown that 30-40% of PID cases is polymicrobial **(5)**.

PID can cause peri-appendicitis and Fitz-Hugh-Curtis syndrome (perihepatitis). It is still unknown how perihepatitis develops, but it is estimated to be present in about 15% of PID cases. It initially presents with moderate to severe right upper quadrant abdominal pain with tenderness, guarding, and mild hepatomegaly. Diagnosis requires chest radiography and abdominal ultrasound.

Most cases have normal liver enzymes. PID due to *N. gonorrhoeae* or *C trachomatis* infection is more likely to develop perihepatitis **(6)**.

Acute salpingitis also predisposes to the development of peri-appendicitis. Peri-appendicitis is usually diagnosed incidentally while patients are undergoing other surgeries. A true appendicitis can be ruled out by blood work and CT scan. Ultrasound should also be performed to rule out other ovarian causes like ectopic pregnancy, ovarian torsion, and tubular abscess, as CT has poor sensitivity in detecting ovarian problems, and may cause unnecessary exposure to radiation **(7)**.

Therefore, this study aimed to find the relation between infertility and pelvic inflammatory disease. To evaluate the frequency of pelvic inflammatory disease among infertility cases at zagazig hospitals.

PATIENTS AND METHODS

A cross-sectional case series study included 191 infertile women selected from the Outpatient Clinics of the Obstetrics and Gynecology Department, Faculty of Medicine, Zagazig University Hospitals**.**

Inclusion and exclusion criteria:

Women who confirmed with tubual infertility. Women with infertility with past history of admission by pelvic inflammatory disease or gynecological procedure related to PID. Women with infertility and had past PID signs or symptoms or her husband had STDs were included. While, anovulation (PCOs), male infertility and hormonal axis abnormalities or anatomical abnormalities were excluded.

Clinical Assessement:

All studied women were subjected to full history taking about fertility condition. Clinical examination were done. Laboratory investigations: including semen analysis, swap, positive result supporting the diagnosis of PID, if available with the patient from the past. Laproscopic or Doppler US reports were records if the patient underwent them. Hospital admition record of the patient if she was admitted by PID complication.

Clinical features suggestive of PID diagnosis:

Bilateral lower abdominal tenderness (moderating to the legs),abnormal vaginal or cervical discharge, fever > 38^{o}C, abnormal vaginal bleeding (intermenstrual bleeding and post coital bleeding),deep dyspareunia, positive cervical excitation, adenxial tenderness with or without tender mass.

Statistical analysis:

Data were analyzed using Epi-Info version 6 and SPP for Windows version 8. The arithmetical mean, standard deviation, median, student t test, and chi-squared test were used to summarise results. The importance threshold is set at the level of 5 percent (p-value). There is less than 5 percent likelihood of error ($p < 0.05$). Non-significant when there is more than 5% risk of error ($p > 0.05$). Extremely important if the likelihood of error is less than 0.1% ($p<0.001$).

RESULTS

This study included 191women with infertility. The age of the studied group ranged from (17 to 36) years, husband age ranged from (18 to 42) and (67.1%) were of low social class **(Figure 1)**. About 55.5% of studied women were primary infertility **(Figure 2)**. Obstetric and gynecological history were summarized in **Figure (3)**. There was statistically significant difference between positive and negative PID patient's parity and social class. But regarding other variables, there was no statistically significant difference **(Table 1)**. There was statistically significant difference between positive and negative PID patients regarding methods of contraception, repeated history of PID and hospitalization due to PID. But regarding other variables, there was no statistically significant difference **(Table 2)**.

There was statistically significant difference between positive and negative PID patients regarding WBCs and bacteruria. But regarding other variables, there was no statistically significant difference **(Table 3)**. There was statistically significant difference between positive and negative PID patients regarding using IUD as contraception. But regarding others,there was no statistically significant difference **(Table 4)**.

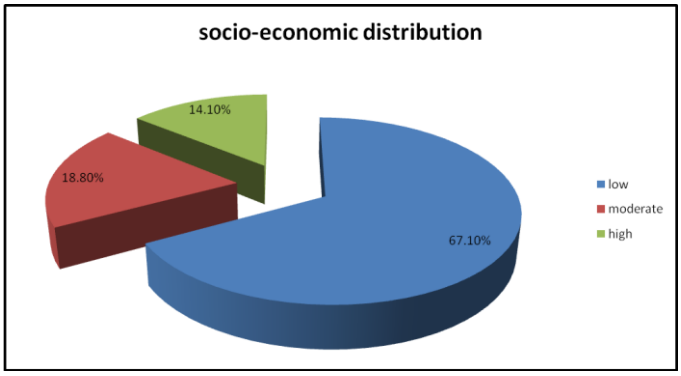

Figure (1): Pie chart for socio-economic distribution in the studied group

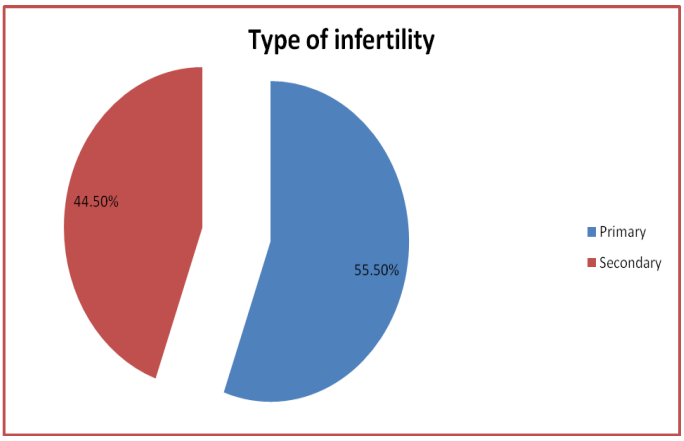

Figure (2): Pie chart for type of infertility distribution in the studied group

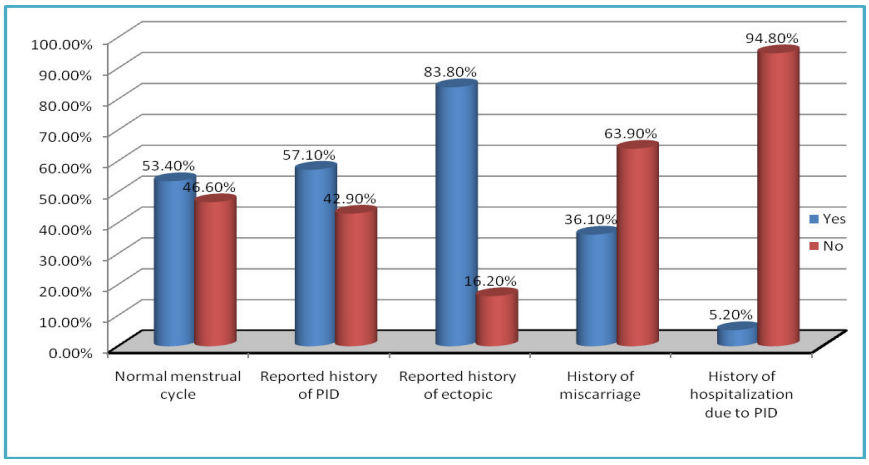

Figure (3): Bar chart for obstetric and gynecological history in the case group

Table (1): Comparing socio-demographic characteristics between positive and negative PID patients

Variable	**positive PID (130) mean ± SD (Range) median**	**negative PID (61) mean ± SD (Range) median**	**Test**	**p-value**
Female age (Years)	23.4±3.2 (17-36) 23	24.3±5.2 (17-36) 24	0.6	0.5

Husband age (Years)	31.2±15.2 (18-42) 30	30.1±12.1 (18-42) 29	0.9	0.3
Duration of marriage (Years)	5.3±10.1 (1-12years) 5	4.9±12.5 (1-12years) 6	1.1	0.4
Variable	**positive PID No(130) %**	**negative PID No(61) %**	**χ^2**	**p-value**
Occupation				
House wife (144)	100 76.9%	44 72.1%	1.5	0.6
working (47)	30 23.1%	17 27.9%		
Education				
Educated (36)	26 20.0%	10 16.4%	2.3	0.4
Non-educated (155)	104 80.0%	51 83.6%		
Parity				
Nulliparous (106)	60 46.2%	46 75.4%	6.7	**0.002***
1 (25)	15 11.5%	10 16.4%		
≥ 2 (60)	55 42.3%	5 8.2%		
Residence				
Urban (59)	36 27.7%	23 37.7%	1.8	0.5
rural (132)	94 72.3%	38 62.3%		
Socio-economic status				
High (27)	23 17.7%	4 6.6%	12.6	**0.001****
Moderate (36)	29 22.3%	7 11.5%		
Low (128)	78 60.0%	50 81.9%		

* Statistically significant difference (P ≤ 0.05) ** Statistically highly significant difference (P ≤ 0.001)

Table (2): Comparing obstetric, gynecological and sexual history between positive and negative PID patients

Variable	**positive PID (130) mean ± SD (Range) median**	**negative PID (61) mean ± SD (Range) median**	**Test**	**p-value**
Age at menarche (years)	13.9±0.84 (12-16) 13.5	14.8±0.91 (12-16) 14	1.7	0.4
Variable	**positive PID No(130) %**	**negative PID No(61) %**	**χ^2**	**p-value**
Type of infertility				
Primary (106)	76 58.5%	30 49.2%	2.1	0.3
Secondary (85)	54 41.5%	31 50.8%		
Contraception methods used				
IUD (36)	30 23.1%	6 9.8%	4.8	**0.03***
Other methods (155)	100 76.9%	55 90.2%		
Normal menstrual cycle pattern				
Yes (102)	70 53.8%	52 85.3%	3.4	0.4
No (89)	80 46.2%	9 14.7%		
Repeated history of PID				
Yes (109)	95 73.1%	14 22.9%	10.5	**0.001****
No (82)	35 26.9%	47 77.1%		

Frequency of sexual intercourse/week						
Once (89)	56	62.9%	33	54.1%	3.1	0.5
more (102)	74	37.1%	28	45.9%		
History of hospitalize- tion due to PID						
Yes (10)	10	7.7%	0.0	0.00%	4.2	**0.004***
No (181)	121	92.3%	61	100.0%		

* Statistically significant difference (P ≤ 0.05) ** Statistically highly significant difference (P ≤ 0.001)

Table (3): Comparing laboratory investigations between positive and negative PID patients

Variable	**positive PID (130) mean ± SD (Range) median**	**negative PID (61) mean ± SD (Range) median**	**Test**	**p-value**
HB(mg/dl)	9.9±1.2 (8.9-12.9) 9.8	10.9±1.3 (8.9-13.1) 10.9	1.3	0.2
LH(iu/ml)	3.1±1.2 (1.9-6.1) 2.6	3.2±1.1 (1.9-6.2) 2.7	0.9	0.4
FSH(iu/ml)	6.2±1.9 (2.8-11.8) 5.8	6.3±2.3 (2.8-12) 5.9	1.1	0.3
TSH(iu/l)	2.4±1.3 (0.5-6.3) 2.1	2.7±1.2 (0.5-2.9) 2.2	0.7	0.6
Variable	**positive PID No(130) %**	**negative PID No(61) %**	**χ^2**	**p-value**
WBC				
Normal (105)	54 41.5%	51 81.9%	15.5	**0.001****
Abnormal (86)	76 58.5%	10 18.1%		
Bacteruria				
Normal (168)	110 84.6%	58 95.1%	5.8	**0.04***
Abnormal (23)	20 15.4%	3 4.9%		
CRP				
Normal (176)	122 93.8%	54 88.5%	2.6	0.7
Abnormal (15)	8 6.2%	7 11.5%		

* Statistically significant difference (P ≤ 0.05) ** Statistically highly significant difference (P ≤ 0.001)

Table (4): Comparing risk factors between positive and negative PID patients

Variable	**positive PID No(130) %**	**negative PID No(61) %**	**χ^2**	**p-value**
passive smoking				
yes	76 58.5%	24 39.3%	3.5	0.6
no	45 41.5%	37 60.7%		
D.M				
yes	12 9.2%	2 3.3%	1.8	0.6
no	118 90.8%	59 96.7%		
Used IUD as contraception				
yes	30 23.1%	6 9.8%	5.7	**0.03***
no	100 76.9%	55 90.2%		

Regular use of vaginal douches					0.8	0.9
yes	76	58.5%	32	52.5%		
no	54	41.5%	29	47.5%		

DISCUSSION:

Infertility defined as a failure to conceive after regular unprotected sexual intercourse for one year in the absence of known reproductive pathology **(8)**. A standard approach to the initial diagnosis of infertility is to perform semen analysis, to document ovulation (serum progesterone and basal body temperature chart) and to demonstrate patency of the tubes (by hysterosalpingography). These tests have been selected as they have definitive correlation with pregnancy. It is estimated that a standard fertility evaluation will fail to identify an abnormality in approximately 15% to 30% of infertile couples **(9)**.

Pelvic inflammatory disease (PID) is defined as the acute clinical syndrome associated with infection of the endometrium, fallopian tubes and/or contiguous structures from microorganisms ascending from the cervix and/or the vagina **(10)**.

This study is aimed to detect the relationship between female infertility and PID. Our results showed that the age of the studied group ranged from 17 to 36 years, husband age ranged from 18 to 42 and 67.1% were of low social class. We tried to compare between two identical groups as regard sociodemographic characteristics, obstetric, gynecological and sexual history, laboratory investigations and risk factors, and to the best of our knowledge, there were few studies comparing PID in infertility cases. Our results showed that there were statistically significant differences between positive and negative PID patients regarding parity, social class, methods of contraception, reported history of PID, hospitalization due to PID, WBCs, bacteriuria and using IUD as contraception.

In a retrospective study of women with tubal factor infertility consistently, **Brunham et al. (11)** document a strong association between past *C trachomatis* infection and tubal damage. **The World Health Organization Task Force on the Prevention and Management of Infertility (12)** demonstrated antichlamydial antibodies in 71% of women with bilateral tubal occlusion compared with 32% women with other etiologies for infertility. A similar relationship was seen with *N gonorrhoeae* infection and tubal factor infertility, with antibodies to the pili of *N gonorrhoeae* present in 62% of infertile women with bilateral tubal occlusion compared with 38% of women with other etiologies of infertility. Importantly, only a minority of these women with bilateral tubal occlusion and who were seropositive for *C trachomatis* or *N gonorrhoeae* reported previous symptoms of acute PID. The high rate of past infection with *C trachomatis* or *N gonorrhoeae*, but not acute symptomatic PID, in women with tubal factor infertility strongly suggests that a large proportion of infection-mediated tubal damage is subclinical.

Similar study revealed high incidence of C. trachomatis infection among women with infertility or gynecological problems. Regarding risk factors affecting PID, it was observed that women, mostly married, sexually active, education is one of the important factors associated with accompanying PID by the rate of 80.03% in non-educated women **(13)**.

However, **Birgisson et al. (14)** found estimated the frequency of self-reported PID in new IUD users compared with women using other contraceptive methods. Among both new IUD users who tested positive for PID and those who tested negative, the PID rate was 1% or below. This against our results which found that there is a significant difference between women who used IUD contraceptives and women with other methods due to regular follow up and sexual behaviour difference, hygiene issue in developed countries differs than in Egypt.

Westrom et al. (15) found tubal factor infertility in almost 90% of cases of infertile patients with PID who were subsequently examined. **Songer et al. (16)** found that views regarding infertility did not differ significantly within any of the marital status, education, or history of PID. They indicated that future infertility is a significant concern for the majority of women with PID. Optimizing access to infertility treatment may affect the quality of life for such women.

Histologic evidence of endometritis on endometrial biopsy, transvaginal sonography or MRI showing thickened fluid-filled tubes, with or without free pelvic fluid or tubo-ovarian complex, laparoscopic abnormalities consistent with PID. Although initial treatment can be made before bacteriologic diagnosis of C. trachomatisor N. gonorrhoea infection, such a diagnosis emphasizes the need to treat sex partners (**Workowski and Bolan, 2015**).

CONCLUSION:

Observed treatment of PID should be initiated in sexually active young women and others at risk for STIs if the following minimum criteria are present and no other cause(s) for the illness can be identified: lower abdominal tenderness or adnexal tenderness or cervical motion tenderness.

No Conflict of interest.

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