

How Prevalent Are Symptoms and Risk Factors of Pelvic Inflammatory Disease in a Sexually Conservative Population.

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Abstract

Background: Pelvic Inflammatory Disease (PID) is the inflammation of the adnexa of the uterus, that mainly manifests in a subclinical/chronic context and goes largely underreported. However, it poses a major threat to women's health, as it is responsible for infertility and ectopic pregnancies, as well as chronic pelvic pain. Previous studies in Jordan have not reported PID, attributed mainly to the social structure of the country which largely represent a sexually conservative population. Our study aims to report the clinical symptoms that point towards PID and investigate the major risk determinants in a Jordanian population, in a cross-sectional study.

Methods: One hundred sixty-eight consecutive adult women that came in the Outpatient Clinics of Gynaecological Department of the Jordan University Hospital were interviewed and their medical history and symptoms were registered and analysed. A Score for PID symptoms, we developed, was given to each woman. Results and correlations were then statistically tested.

Results: Our study population consisted of relatively young women (37.7 ± 11) that had their first child at an average age of $24.1 (\pm 4.8)$ and a mean parity of $3.1 (\pm 2.2)$. Fifty-eight women (34.5%) reported having undergone at least one CS, while the mean PID Symptom Score was $3.3 (\pm 2.3)$. The women in our study exhibited 8 symptoms of PID, namely dysmenorrhea and vaginal discharge; being the commonest (45.2% and 44.6% respectively), in addition to chronic pelvic pain, pelvic heaviness, , menorrhagia, dyspareunia, , urinary symptoms, and smelly urine, and reported history of 3 conditions that can be attributed to PID, that is infertility, preterm labour, and miscarriages.

Conclusions: Our PID Scoring System seems to identify the risk factors of PID and predict well the PID likelihood. This score predicts that women with higher parity, who used contraceptives and underwent any invasive medical procedure are expected to score higher in the PID Symptom Score. Our data also suggest that PID should not be ruled out in the Jordanian population when symptoms are compatible to this diagnosis.

Plain English Summary

As a sexually conservative country; Jordan is thought to have prevalence of pelvic inflammatory disease, the prevalence of STD pathogens is very low, however many patients present with symptoms of PID, so we interviewed 168 random healthy participants and asked them if they have the symptoms that are related to PID, surprisingly the percentage of participants who had symptoms of PID was high, reaching up to 64% for some symptoms, we then created a PID symptom score; where every symptom gets one mark (1-11), and tested it for association against independent factors. As a result it can be predicted that a woman with higher parity, who used contraceptives, and underwent E & C, D & C, HSG, or Hysteroscopy is expected to score higher in the PID Symptom Score.

This result draws attention to PID in similar conservative communities, and therefore further research is needed to confirm the prevalence of PID and identify the causative agents

Background

Pelvic Inflammatory Disease (PID) is the inflammation of the adnexa of the uterus, namely the uterus, the fallopian tubes, the ovaries, and the pelvis. It is caused by persistent pathogenic infections that permits the microorganisms to ascend from the initial infection point (the vagina and the endocervix) to the endometrium or beyond [1]. It presents a range of clinical manifestations from totally asymptomatic to endometritis, parametritis, tubo-ovarian abscess, salpingitis, oophoritis, pelvic peritonitis, perihepatitis (Fitz-Hugh-Curtis syndrome) and even ovarian carcinogenesis [2]. PID is the cause of about 30% of infertility cases and 50% of ectopic pregnancies, therefore it presents a significant public health and economic burden, for women in the reproductive age [3].

Despite its obvious importance in women's health, the prevalence of PID is unclear because it is largely underreported, either because it is asymptomatic or with mild symptoms [4] or because of social and ethical constraints. Due to financial and technical difficulties, PID prevention programs based on pathogen screening are not available or reliable in many countries, thus the actual burden of PID may be even greater than anticipated [5]. A self-reporting USA survey, in 2013–2014, estimated the PID incidence to 4.4% [6], a slight decline from previous reports [7]. USA currently runs a preventive program against chlamydia and gonorrhoea infection in adolescents, to help prevent PID, but questions are raised on whether youngsters might be keen on participating [8].

The identification of the pathogen responsible for PID is hampered by the imprecision in diagnosing PID, the difficulty in sampling the upper genital track [9], the frequent super-infection [10], [11] and the difficulty of identifying the pathogen [12]. Present data suggest that *N. gonorrhoeae*, *C. trachomatis* and/or *M. genitalium* are present in about 30% of PID cases [6], [13] and Bacterial Vaginosis-associated or urogenital pathobiontic bacteria (i.e. *S. agalactiae*, *Staphylococcus aureus* and Enterobacteriaceae) in about 70% of cases [14]. Some BV-associated organisms seem to be associated with PID, whereas others not [15].

While the incidence of PID is correlated strongly with the prevalence of sexually transmitted diseases, a fraction of the infections might be of endogenous origin. The use of intrauterine contraceptive devices and abortions procedures, even legal ones, contribute to the increase the risk of occurrence. A study in India linked the low socio-economic status, illiteracy, the use of intrauterine device, the number of sexual partners and the young age of marriage with the increased occurrence of PID [3], while in Nigeria PID is associated with polygamy practices [16]. Therefore, it is obvious that local traditions and practices may affect the actual prevalence and the reporting of the disease.

Jordan is an Islamic conservative country and sexuality is not encouraged outside wedlock. Therefore, it is not surprising that chlamydial infection is exceptionally low in Jordan, reaching 4.6% among symptomatic patients with urethritis, of both sexes [17]. An even older thesis estimated the *C. trachomatis* infection to 5.7% in men and 3.3% in women [18]. This is markedly lower than Western more liberal societies, where the chlamydial infection can reach as high as 39.3% in adolescent men and 11.1% in women in USA [19]. A USA report of the staggering 19.5% prevalence of PID in a cohort of adolescent

females presenting to an urban emergency with abdominal or genitourinary complaints, shows the impact on western youth [20].

However, there is a rarity of PID reporting in Jordan, and an older seven-year report about ectopic pregnancy did not show any relevant PID aetiology [21]. In this study we attempt to investigate the amplitude of PID symptoms in Jordan's women and to assess the relation of those symptoms to potential causative conditions, such as uterine instrumentation. Our aim is to identify the risk factors of PID in the Jordanian community, design an effective intervention that can minimize the occurrence, devise a triage system for women at risk in the Outpatient Clinics in Jordan and develop a model that can act as a decision support system to better health care.

Method

Study Design

This is a cross-sectional observational study conducted between August 2019 and March 2020. Patients included in this study were consecutive women that came to the Outpatient Clinics of Gynaecological Department of the Jordan University Hospital (JUH), Amman/Jordan, either as patients or visitors. This study focuses on the PID symptoms' range and risk factors, in the Jordanian population.

Study Population

One hundred sixty-eight (168) non-pregnant married or previously married Jordanian women, aged 18 years old and above were included in the present study. The aim of this study was to determine the aetiology of PID in our study population, the prevalence of the PID symptoms and the impact of PID on the well-being of these women as well. The inclusion criteria required women to provide an informed written consent to participate in the study. They had to be 18 years old or above, confirmed non-pregnant, with no known history of previous genital infections. Exclusion criteria were patients that refused to participate, underage women, pregnant women regardless of their age and patients that had a recent (less than 6 months) history of miscarriage or childbirth.

Data Collection and Study Tool

The data were collected using an electronic structured questionnaire filled by eight researchers, that participated in this study, during a short interview in the Outpatient Clinics. The questionnaire contained an informed consent form and medical history questions in three sections. The first section contained the demographic data, namely personal information such as name (optional), mobile phone (optional), date of birth and marriage age. Personal information was collected to be able to contact the women about a summary of this study's results, if they were interested. In this first section, general obstetric details were recorded including parity and age at first birth. The second part contained the PID symptoms and complication including chronic pelvic pain, pelvic heaviness, dysmenorrhea, menorrhagia, dyspareunia, vaginal discharge, recurrent miscarriage, and infertility. The third portion contained some known predisposing factors such as lower pelvic surgeries including Caesarean Section (C/S) and

Appendectomy, Dilation and Curettage (D&C), *in vitro* fertilization (IVF), Intracytoplasmic Sperm Injection (ICSI), use of intrauterine contraceptive device (IUCD), hysterosalpingography (HSG) and hysteroscopy.

Data were extracted to excel files and analysed statistically using SPSS software. Analysis included descriptive statistics (percentages and means) and correlation statistic (regression analysis).

Ethical Considerations

This study was approved by the Ethical Review Committee (ERC) of the Faculty of Medicine at the University of Jordan and the Institutional Review Board (IRB) at Jordan University Hospital.

Data collection was conducted inside a private clinic room and the women were asked for consent to participate in the research, before gathering their data. Confidentiality of the data was assured, the study aim was explained, and participants signed the consent. The names and other identifiers were covered and not divulged to researchers involved in the data analysis.

Results

Demographic Data

Our study population consisted of 168 Jordanian women aged between 19 and 66 years, with a mean age of 37.7 years (SD = 11). Their age of marriage ranged from 12 and 40 years old, with a mean marriage age of 22.9 years old (SD = 5.1). The age upon their first childbirth ranged between 15 and 41 years old, with a mean age of 24.1 years old (SD = 4.8) and a mean parity of 3.1 (SD = 2.2). Table 1 summarizes the demographic data of the women studied. Most of the women (82.7%) were pre-menopausal and the majority were married (96.4%) at the time of data collection. Most women had less than 3 children, with the one child being more frequent, but this is expected, given the young age of the women participating.

Table 1
Demographic Characteristics (N = 168)

Characteristic	No	%
Marital Status		
Married	162	96.4
Divorced	4	2.40
Widow	2	1.20
CS Experiences		
0	110	65.50
1	23	13.70
2	18	10.70
3	8	4.80
4	6	3.60
< 4	6	3.60
Miscarriage		
0	96	57.10
1	44	26.20
2	16	9.50
3	7	4.20
> 4	5	3.00
Menopause		
Pre-	139	82.70
Post-	29	17.30

Fifty-eight women (34.5%) reported having undergone at least one CS. Of whom, 23 reported having CS only once, 18 women had CS twice, 8 women had CS three times, 6 women had CS four times, and 3 women reported having CS more than four times. Seventy-two women (42.9%) reported experiencing at least one miscarriage. Of whom, 44 women had miscarriage once, 16 women had miscarriage twice, 7 women had miscarriage three times, and only 5 women had more than three miscarriage experiences.

Prevalence of PID Symptoms

The women in our study exhibited 8 of the most common symptoms of PID, namely chronic pelvic pain, pelvic heaviness, dysmenorrhea, menorrhagia, dyspareunia, vaginal discharge, urinary symptoms, and smelly urine, and reported history of 3 conditions that can be attributed to PID, that is infertility, preterm labour, and miscarriages. Table 2 shows the prevalence of each of these symptoms and conditions, ranked from the most to the least prevalent. Dysmenorrhea and vaginal discharge were the most common symptoms affecting more than 40% of women, while dyspareunia; a symptom closely related to PID, affected more than a quarter.

Table 2
Prevalence of PID Symptoms

	Symptom	Prevalence %
1	Dysmenorrhea	45.2
2	Vaginal discharge	44.6
3	Miscarriage	42.9
4	Menorrhagia	29.8
5	Dyspareunia	26.8
6	Urinary symptoms	26.2
7	Smelly urine	23.8
8	Chronic pelvic pain	13.7
9	Pelvic heaviness	13.1
10	Preterm labour	12.5
11	Infertility	7.7

A score for PID symptoms was then computed for each woman, giving her an overall PID Symptom Score between (0–11). The mean of the PID Symptom Score was 3.3 (SD = 2.3), ranging from 0 to 11, and was tested against a variety of independent factors, using the independent-sample t-test. As shown in Table 3, the independent factors were found to be significantly associated with the PID Symptom Score were: the use of contraceptives ($t = -1.560$, $p = 0.044$), E&C procedures ($t = -5.392$, $p = 0.000$), hysteroscopy ($t = -2.200$, $p = 0.029$), D&C procedures ($t = -2.669$, $p = 0.008$), and HSG ($t = -2.552$, $p = 0.011$). On the other hand, having CS, IUCD, IVF, or IUI were not found significantly associated with the PID Symptom Score.

Table 3
Independent Factors Associated with PID
Symptom Score

Independent Factor	T	P
CS	.723	.471
Use of contraceptives	1.560	.044*
IUCD	-.037	.970
E & C	-5.392	.000*
D & C	-2.669	.008*
IVF	.119	.906
IUI	.897	.602
HSG	-2.552	.011*
Hysteroscopy	2.200	.029*
* Statistically significant (p < .05)		

Determinants of PID Symptoms

Multiple linear regression was used to establish the social determinants of PID symptoms among Jordanian women. PID Symptom Score is a dependent variable, and the Parity, Use of Contraceptives, E&C, D&C, HSG, and Hysteroscopy are the independent predictors. Regression F_5 of 6.043 ($p = 0.000$) was significant for these variables. The model's $R = 0.576$ and $R^2 = 0.332$ indicate that the combination of these six independent predictors (Para, Use of Contraceptives, E&C, D&C, HSG, and Hysteroscopy) can explain approximately 33% of variance in PID symptoms among Jordanian women. Table 4 shows the standardized coefficient (Beta), t statistic, and p value for each of the independent predictors of this multiple linear regression model.

Table 4
Multiple Linear Regression Model of PID
Symptom Score

Predictor	Beta	t	p
Para	.020	.245	.807
Use of contraceptives	.017	.217	.829
E & C	.361	4.731	.000
D & C	.075	.944	.347
HSG	.119	1.553	.122
Hysteroscopy	.077	.998	.320
Model's $F_5 = 6.043$, $p = .000$, $R = .576$, $R^2 = .332$			

Discussion

Nowadays, smart patient management is becoming increasingly important in health care. Several attempts have been undertaken, globally and in Jordan [22]. One way to be efficient in health care delivery is to understand and address the most important health issues. Pelvic Inflammation Disease is obviously an underdiagnosed disease that silently plagues women, worldwide. The aim of this study is to contribute to the task of understanding PID in Jordan and assess the practices that contribute to its appearance.

We developed a PID symptom score, ranging from 0 to 11, that assesses the PDI risk and shows significant association with possible causes of PID. These risk factors include the use of contraception and the insertion of medical instruments in the uterus (e.g. uterine evacuation, hysteroscopic procedures and hysterosalpingograms). Medical instruments might introduce pathogens to the uterus [23], therefore intrauterine contraception devices (IUDs) have been implicated to PID development [24]. Oral/hormonal contraceptive (OC), on the other hand, fail to prevent sexually transmitted infections and thus contribute to a higher PID risk [25], although older reports suggested that OCs could protect against gonorrhoea and reduce PID by 40% [26], [27]. Although condoms are clearly the best protective means to vaginal infection and thus to PID, only 15 (8.9%) of the women in our study reported using it and one third of those (5 cases) used it inconsistently, alternating it to other methods.

Despite the finding that pregnant women, in Amman Jordan, exhibit a high incidence of Group B Streptococcus colonization [36], previous reports on Chlamydia and Gonorrhoea prevalence in the general Jordanian population, found it was low [17], inferring a similarly low PID prevalence. However, our study reveals that the PID-related condition and the frequency of PID symptoms are surprisingly high in our community, although these symptoms could be attributed to other pathologies. Nevertheless, PID is strongly suspected to the symptoms described, especially since frequent alternative aetiologies, such as endometriosis and pelvic pathologies, are not prevalent in the Jordan [30].

Our data also suggest that the women experienced mild chronic symptoms, suggesting that chronic or subclinical PID is more prevalent, while acute PID is rare, which is consistent with the literature. However, the distribution of symptoms in relation to age and parity is different, because the literature states that younger women have higher PID prevalence [28], while in our study the symptoms are equally distributed among ages and parities, with no significant statistical. This observation clearly supports the notion of a different etiology and pathophysiology. Our data predict that women with higher parity, who used contraceptives, underwent E&C, D&C, HSG, or Hysteroscopy are expected to score higher in the PID Symptom Score.

It is worth noting that women came to accept the disease discomfort as part of their life, not actually seeking treatment. This is a rather common pattern for this disease and largely contributes to its underreporting, and possibly could reflect cultural beliefs. A report about foreign women in Sweden stated that the highest risks of PID were found among women from southern Europe, Eritrea/Ethiopia/Somalia, and other African countries, although Sweden offers publicly financed health care to all [29]. A previous report, in Jordan, showed that women are not adequately aware of their healthcare. Almost half (47.2%) of health care workers did not know that a Pap test was freely available to them and only 26% of them knew the existence of an HPV-vaccine [30].

In summary, PID is a potential health issue in Jordan and sexual transmitted diseases do not seem to be the main culprit, given the conservative society structure. Therefore, alternative aetiologies have to be thoroughly investigated and pathogen prevalence studies to be conducted. Our newly developed PID scoring system can provide useful insights and highlight high risk behaviours.

Conclusion

Chronic/subacute PID is probably quite common in our population and has a wide age of distribution. Women who have high parity, use contraception, and those who underwent uterine instrumentation are at high risk. Though Jordan is a conservative society but PID should be considered whenever symptoms are suggestive.

The small number of participants may hamper the power of the study but reflects, nevertheless, the size of our country. We understand that more rigorous sampling is needed to validate our scoring system and assess more accurately the PID prevalence in Jordan.

Abbreviations

PID: Pelvic Inflammatory Disease; C/S: Caesarean Section; D&C: Dilation and Curettage; IVF: *in vitro* fertilization, ICSI: Intracytoplasmic Sperm Injection; HSG: hysterosalpingography; IUCD Intrauterine contraceptive device; OC: Oral contraceptive.

Declarations

Ethics approval and consent to participate:

This study was approved by the Ethical Review Committee (ERC) of the Faculty of Medicine at the University of Jordan and the Institutional Review Board (IRB) at Jordan University Hospital (822/2020/67).

Data collection was conducted inside a private clinic room and the women were asked for consent to participate in the research, before gathering their data. Confidentiality of the data was assured, the study aim was explained, and participants signed the consent. The names and other identifiers were covered and not divulged to researchers involved in the data analysis.

Consent for publication:

Our manuscript does not contain any individual person's data in any form

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Authors' contributions:

OA produced the research subject, participated in the study design and did the writing up, LA helped in the design questionnaire and writing up, HD did the statistical analysis and analyzed the results, NA supervised data collection and helped in writing up and reviewed the paper, while the medical students; BA, AS, ZO, SaA, ShA, NaA, NoA and WA designed the questionnaire and collected the data. All authors read and approved the final manuscript.

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Not applicable

Competing Interests:

The authors declare that they have no competing interests.

AVAILABILITY OF DATA AND MATERIALS:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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