Original Article

Compatibility of Prescribed Antibiotics to Patients with Pelvic Inflammatory Diseases with Microbial Sensitivity Test in Duhok, Iraq

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Abstract

Background: Pelvic inflammatory disease (PID) is a clinical syndrome that has the wide range of infections and inflammatory diseases of the upper female genital tract. Microbiological researches revealed that multiple bacteria have been identified as causative agents and several types of antibiotics are required to cover causative pathogens. The choice of an appropriate treatment mostly depended on antimicrobial sensitivity tests. **Objectives:** The present study aims to investigate the compatibility between the prescribed antibiotics given to patients with PIDs based on the clinical features with microbial sensitivity tests. **Materials and Methods:** The present study included 70 patients who attend Amedy hospital in Duhok province and screened for PIDs based on the clinical features. Due to the lack of antimicrobial-sensitivity culture tests, the patients are treated according to the standard treatment. The clinician records the clinical features of each patient with their prescribed drugs and antibiotics and takes an endocervical swab of each patient. These swabs are undergone microbial sensitivity tests for drug resistance. **Results:** The results revealed that 62.86% of patients were positive for the infection pathogens. There were 13 bacterial isolates of *Staphylococcus aureus* as the most commonly isolated organism in (29.55%) of cases followed by *Candida* specious (25%) and Streptococcus pyogenes (15.1%) with one case of *Escherichia coli* (2.27%). Seven antibiotic and antifungal drugs were the most prescribed antibiotics to patients with PIDs. **Conclusions:** The results of our study concluded that treating PIDs according to the standard treatment and based on clinical symptoms only is limited to coverage these diseases. Additional clinical and microbial sensitivity test are required before prescribed antibiotics or antifungal to patients with PIDs.

Keywords: Antibiotics, endocervical, pelvic inflammatory, sensitivity test

Introduction

Pelvic inflammatory disease (PID) has the wide range of infections and inflammations of female upper reproductive tracts that ascends from the vagina and cervix. The disease is most frequently affecting sexually active females and women of child-bearing age.[1]

Most of the PID patients are associated with sexually transmitted infections. Although it is most notable for the related risk of severe, long-term sequelae, the infections may be asymptomatic or overt with mild-to-severe symptoms.[2]

The diagnosis of PID is primarily clinical. It must be suspected in female patients with lower abdominal or pelvic pain and genital tract tenderness. Other causes of pain may be considered during patient evaluation such as ectopic pregnancies.[3]

Usually, PID is treated with antibiotics and covers some primary pathogens including *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. The disease has short-term complications such tubo-ovarian or pelvic abscess and long-term complications such

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as ectopic pregnancy, infertility, and chronic pelvic pain. Early diagnosis and treatment potentially prevent complications.[4,5]

Furtherore, PID should be considered in any sexually active young woman with pelvic or low abdominal pain and evidence of genital tract tenderness on examination, whereas laboratory tests may help confirm the diagnosis, even an ultrasound or computed tomography without the findings of PID does not exclude the diagnosis. Therefore, early and prompt treatment should be started based on the clinical suspicion.[6,7]

The main intervention strategies for acute PID are the use of broad-spectrum antibiotics which cover *Chlamydia trachomatis*, *N. gonorrhoeae*, and anaerobic bacteria, administered intravenously, intramuscularly, or orally.[8]

The most used antibiotics used in Chronic PID treatment includes doxycycline, clindamycinm, gentamycin, ampicillin, metronidazole, ofloxacin, ornidazole, sulbactam plus doxycycline, ceftriaxone, or cefoxitin plus doxycycline.[9]

PID is a polymicrobial infection, and it may cause by different pathogens such as parasite, virus, fungi, and bacteria; therefore, more than one antimicrobial drug is generally prescribed in the treatment regimen. This treatment is mostly based on the identification of causative agents and their drug-sensitivity patterns.[10]

The patients who attend Amedy hospital, located in Amedy district in the East of Duhok province 70 kilometers with more than 10,000 populations, are screened for the eligible diagnostic criteria of PIDs based on the clinical features are treated according to standard treatment, due to unavailability of the laboratory diagnosis of pathogens and microbial sensitivity tests. Therefore, the present study aims to examine the compatibility between the prescribed antibiotics given to patients with PID diseases based on the clinical features with microbial sensitivity tests.

Materials and Methods

Design and sampling

The women at reproductive ages who attended the outpatient clinic of a hospital and were diagnosed with PID are participated in the current investigation. The patients who attend the clinic (Amedy Hospital, Duhok province, Iraq) are screened for the eligible diagnostic criteria of PID based on the clinical features. The patients who are diagnosed with PID are treated according to the standard treatment.

The clinician records the clinical features of each patient with their prescribed drugs and antibiotics in a predesigned questionnaire. The clinician takes an endocervical swab of each patient. These swabs are undergone microbial sensitivity tests for drug resistance at the Department of microbiology, College of Medicine, University of Duhok during the period of January 2019 till August 2019.

A total of 70 patients, aged between 17 and 48 years, are included in the present study are those who are diagnosed with PIDs. The patients with other infection than PID or immunological disorders were excluded from the study.

Diagnosis of pelvic inflammatory diseases

The diagnosis of PIDs is based on the following clinical features: Symptoms in women with clinically suspected pelvic, inflammatory disease, abdominal pain, abnormal discharge, intermenstrual bleeding, postcoital bleeding, fever, urinary frequency, low back pain, nausea, and vomiting. In this study, only seven antimicrobial drugs were used for treating PID. Antimicrobial drugs used to treat PIDs based on clinical features are listed in Table 1.

Microbiological procedure

To detect possible drug resistance in common pathogens and to assure susceptibility to drugs of choice for particular infections, the antimicrobial susceptibility testing is performed for the study purpose. The procedure is performed according to the steps presented by Jorgensen and Ferraro.[11] The results were interpreted according to the Clinical Laboratory Standards Institute guidelines.[12]

The endocervical specimens are, respectively, cultivated on blood agar media and incubated aerobically at 37°C for 24 h; the Chocolate agar culture was in addition incubated with increased 10% CO_2. Additional blood agar cultures of specimens are subjected to anaerobic incubation at the same temperature and time as the aerobic cultures for the possible detection of the presence of obligate anaerobes.

Statistical methods

The descriptive purposes of the study are presented in the frequency distribution either mean and standard deviation or frequency and percentage. The prevalence of microbial infections is determined in frequency and percentage. The compatibility of the prescribed antibiotics based on the clinical features and those determined in the sensitivity test is determined in sensitivity and specificity tests. The possible association is examined in Chi-square tests. The statistical calculations are performed by the Statistical Package for the Social Sciences software version 24 (SPSS, IBM Company, Chicago, IL 60606, USA).

Results

The present study included 70 cases of PID who visited Amedy hospital and diagnosed based on the clinical features as of

Table 1: Antimicrobial drugs used to treat pelvic inflammatory diseases based on the clinical features

#	Trade name of drugs	Antibiotic
1	Doxycycline 100 mg	*Tetracycline*
2	Suprax 400 mg	*Cefixime*
3	Amikacin 500 mg	*Kanamycin*
4	Uvamin 100 mg	Nitrofurantoin
5	Levofloxacin 500 mg	Levofloxacin
6	Mygogel	Spiramycin
7	Mycoheal	Miconazole antifungal

pelvic inflammatory patients during the period of January 2019 till August 2019.

The age of patients ranged from 17 to 48 years, with a mean of 33.29. Table 2 shows the age distribution of enrolled patients, the studied groups was divided according to age groups and the result showed that the age ranged from (21 to 30) years were found to be highly frequent.

Out of 100 endocervical specimens collected from female patients with certified cases of PID and cultivated on cultures, the identification of isolates revealed that 44 (62.86%) samples had positives cultures, while sterile cultures constituted 26 (37.14%).

Most female patients participated in the current study were married. Out of 70 cases, married females were 61 (87.14%), whereas no unmarried female patients participated. Table 3 shows the distribution of cases according to marital status.

Identification of isolated pathogens grown on culture plates revealed that *Staphylococcus aureus* had the highest frequency of 13 (29.55%), whereas *Escherichia coli* species had the lowest occurrence frequency of only 1 (2.27%) case [Table 4]. It shows the frequency of isolated pathogens.

Table 2: Distribution of patients with pelvic inflammatory disease according to the age groups

Age groups	Number of cases, *n* (%)
<20	5 (11.36)
21-30	39 (22.73)
31-40	18 (38.64)
More than 40	9 (20.45)
Total	70 (100.00)

Table 3: Distribution of pelvic inflammatory disease cases according to marital status

Marital status	Number of patients, *n* (%)
Unmarried	0
Separated	6 (8.57)
Married	61 (87.14)
Remarried	1 (1.43)
Widow	2 (2.86)
Total	70 (100)

Table 4: Distribution of different pathogens isolated from patients with pelvic inflammatory disease

Isolated organisms	Total number of isolates, *n* (%)
Staphylococcus aureus	13 (29.55)
Staphylococcus epidermidis	9 (20.45)
Streptococcus pyogenes	7 (15.91)
Streptococcus agalactiae	3 (6.82)
Escherichia coli	1 (2.27)
Candida spp.	11 (25.00)
Total	44 (100)

The association between the pathogens isolated and their antibiotic sensitivity patterns revealed that it was found that *S. aureus* was more sensitive to *Kanamycin* 11 cases, nitrofurantoin in 12, and *tetracycline* in 11 cases, while *E. coli* was found to be more sensitive to *Cefixime*, nitrofurantoin, and levofloxacin. Antibiotic sensitivity rates for all isolated bacteria are shown in Table 5.

Discussion

PID is an infection of the female upper genital tract, including the endometrium, fallopian tubes, and ovaries. Most cases of PID are caused by sexually transmitted infection, such as *C. trachomatis* or *Neisseria gonorrheae*.[2]

The PID is one of the most common clinical complaints in gynecologic practice which implies inflammation of the upper genital tract involving fallopian tube as well as ovaries because most of PID is due to ascending or blood borne infection, the lesion is often bilateral though one tube may be affected than the other.[4]

These results of the current study revealed that most patients were in the age group ranged from 20 to 30 years and most of them are married which comprise (87.14%). These results are closely similar to results of Seifoleslami and Heidari[13] who reported that out of 1104 Iran married patient with PID, nearly (82.34%), were married. While in the study by Simms and his colleagues,[14] single participants were the most one of the predisposing factors for PID. It is clear that married females in our country are sexually active and they are at risk of PID disease more than unmarried girls, this meant that unmarried patents and probably had no sexual partner and sexually inactive due to social and religious tradition and habits; therefore, we did not participated any unmarried female patient in our study because legally and ethically it's not permitted to take endocervical swab from them.[13,14]

Many studies conducted about the causative agents of PID and demonstrated that there are numerous pathogens that described as and reported; therefore, a broad spectrum antibiotic and antifungal therapy is required to cover possible pathogens. The choice of an appropriate treatment regimen mostly depends on the specific pathogen that causes this disease.

In our previous unpublished study on 150 female patients with PID regarding isolation and identification of pathogens associated with PID in patients who attend different clinics and hospital in Duhok province, Kurdistan region of Iraq,[15] we reported that nearly (55.4%) of endocervical samples were had positive culture which are not significantly different from recent results which comprise (62.86%).

Our previous study also reported that the most prevalent pathogens obtained from cultured of endocervical samples of patients with PID were *Staphylococcus* species, *Streptococcus* species, and *Candida* species. Among them, the *Staphylococcus* species was the most frequent causative agent in both previous and present studies representing were (68.47%) and (50%),

Table 5: Antibiotic sensitivity rates (%) of isolated bacteria

Antibiotics	*Staphylococcus aureus*	*Staphylococcus epidermidis*	*Streptococcus pyogenes*	*Streptococcus agalactiae*	*Escherichia coli*	Susceptibility (%)
Tetracycline	11	6	0	0	0	8.5
Cefixime	0	0	3	3	1	3.5
Kanamycin	13	5	0	0	0	9
Nitrofurantoin	12	5	0	0	1	9
Spiramycin	0	0	1	2	0	1.5
Levofloxacin	8	2	3	3	1	8.5

respectively. The results of both studies strongly support each other. However, most gynecologists in Duhok province suggest antibiotic and antifungal drugs that are sensitive to these pathogen even according clinical features and without doing microbial sensitive test. However, this is not mean the other pathogens are not present,[15] therefore, the routine treatment of PID must not base on clinical features only and the choice of an appropriate treatment most depends on the specific pathogen that causes this disease.

Patients participated in the current study received six types of antibiotics plus one antifungal drug to treat the PID which are prescribed by gynecologist according to patient's clinical signs and features. Some of these drugs were successful in covering complications of the disease, but the use of these recommended antibiotics antifungal drug did not observed symptomatology improvement several days which includes no fever, reduced pelvic pain, and reduction in abdominal pain because most of patients did not return and visited hospital to follow-up their treatment. Therefore, no certain data are available regarding to their health state improvement.

The results of the present study suggested that the facilities both for isolating organisms and testing for their antibiotic sensitivity pattern are limited in developing countries, especially in rural cities. This problem can be overcome by establishing well-equipped regional centers that that could perform all the categories of laboratory diagnosis, especially the test needed for cultures and antimicrobial sensitivity test.

Conclusions

The results of our study concluded that treating PIDs according to standard treatment and based on the clinical symptoms only is limited to coverage these diseases. Additional clinical and microbial sensitivity tests are required before prescribed antibiotics or antifungal to patients with PIDs.

Ethical consideration

The ethical approval of the present protocol is taken from the Division of Scientific Research; Department of Planning, Duhok General Directorate of Health/Duhok. The confidentiality of the personal information of the patients is protected throughout the study steps.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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