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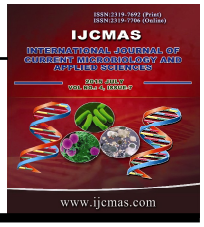

Original Research Article

Susceptibility of Pathogens Associated with Pelvic Inflammatory Disease to Antimicrobial Agents in Western U.P. India

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Keywords

Pelvic inflammatory disease (PID), Endometritis, Salpingitis, Parametritis, Oophoritis, Tuboovarian abcess

A B S T R A C T

Pelvic inflammatory disease (PID) is usually the result of infection ascending from the endocervix causing endometritis, salpingitis, parametritis, oophoritis, tuboovarian abscess and/or pelvic peritonitis. PID is a fairly common problem among woman and usually reflects long and often neglected story of reproductive morbidity. Multiple bacteria have been identified as causative agents. Broad spectrum antibiotic therapy is required to cover possible pathogens. The choice of an appropriate treatment regimen may be influenced by evidence on local antimicrobial sensitivity patterns. Hence taking these into consideration, the present research work had initiated to search the microbial etiology of PID along with their antibiotic sensitivity pattern. The results revealed that about 76 % of patients were positive for the infection, there were five micro organisms isolated with *Staphylococcus aureus* as the most commonly isolated organism in 40.79% of cases followed by *Klebsiella species* with 25.00%, *Escherichia coli* 13.15%, *Pseudomonas species* 7.90% and *Candida albicans* 13.15%. Age group (26-30 years) were significantly more infected with bacteria than any other age group. Only twelve antibiotic disks were used in testing for sensitivity of the isolated bacteria. Penicillin, ampicillin and tetracycin were the most frequently resistant antibiotics with 72%, 52% and 71% resistance rates. The remaining nine antibiotics had > 50% sensitivity rate.

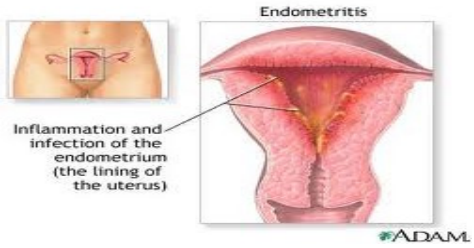
Introduction

Chronic infection and inflammation of the internal genital organs is known as chronic pelvic inflammatory disease (PID). PID is initiated by infection that ascends from the vagina and cervix causing endometritis, salpingitis, parametritis, oophoritis, tuboovarian abscess and/or pelvic peritonitis.

PID is a vague term and can refer to viral, fungal, parasitic & most commonly bacterial infections (Loscalzo *et al.*, 2001). It often starts with an acute sexually transmitted infection such as gonorrhoea or, more commonly, Chlamydia (Bevan *et al.*, 1995; Templeton, 1966). Mycoplasma *genitalium*

has also been associated in some cases of PID (Cohen *et al.,* 2002).

Chlamydia infection may go undiagnosed for years thus produces chronic inflammation of the pelvic organs with scarring, adhesions, and tubal blockage. The damaged organs are also become vulnerable to infection by other bacteria, so that chronic PID often involves multiple bacteria, Gardnerella *vaginalis*, Haemophilus *influenzae*, and anaerobes, such as Peptococcus and Bacteroides species. It is likely that delaying treatment increases the risk of long term sequelae such as ectopic pregnancy, infertility and pelvic pain (CDC, 2002; Hillis *et al.,* 1993).



PID is an expensive public health problem. It has been estimated that the direct costs of treating PID in the U.S. exceeds billion annually. These costs do not include the indirect costs of treating sequelae such as infertility, ectopic pregnancy & preterm birth.

More than 10% of reproductive aged women reported a history of PID. 75- 80% women are affected by PID each year, classic high-risk patient is a menstruating woman younger than 25 years who has multiple sex partners, does not use contraception & lives in an area with a high prevalence of Sexually Transmitted Disease (STD Facts, 2007; Sutton *et al.,* 2005). *N. gonorrhoea* is isolated in 40–60% of women with acute salpingitis, C.*trachomatis* is estimated to be the cause in about 60% of cases of salpingitis, which may lead to PID. However, not all PID, are caused solely by STIs; organisms that are considered normal vaginal flora can be involved, and individual cases of PID can be due to either a single organism or a co-infection of many different species. 10% of women in one study had asymptomatic *C. trachomatis* infection and 65% had asymptomatic infection with *N. gonorrhoea*. It was noted in one study that 10–40% of untreated women with *N. gonorrhoea* developed PID and 20–40% of women infected with *C. trachomatis* developed PID. A large proportion of the ectopic pregnancies occurring every year are due to the consequences of PID.

Clinical symptoms and signs lack sensitivity and specificity (the positive predictive value of a clinical diagnosis is 65–90% compared to laparoscopic diagnosis) (Loscalzo *et al.,* 2001; CDC, 2002; Morcos *et al.,* 1993).

Regimen used in Chronic PID includes Doxycycline, Clindamycin plus gentamycin, Ampicillin, Metronidazole, Ofloxacin, Ornidazole, Sulbactam plus doxycycline, Ceftriaxone or cefoxitin plus doxycycline (Pelvic Inflammatory Disease treatment at eMedicine).

Since PID involves multiple bacteria, more than one antibiotic is generally prescribed in treatment regimen. The treatment of PID is based on the response and the recovery of the patient i.e., based on identification of causative agents and their drug sensitivity patterns. As PID results due to Microbial synergism, antibiotic resistance makes the selection of an optimal antibiotic regimen difficult (Melvin, 1990). The necessity for its control has been endorsed by many nations and healthcare professionals (Finch, 2012). However, antibiotic resistance in the organisms leads to the difficulty in treatment and gives poor clinical cure rates in the women suffering from PID. Taking these into consideration the present study deals with the isolation and identification of the

pathogens associated with PID and assessment of antibiotic sensitivity pattern of the isolated pathogens.

Material and Methods

The study involved 100 clinical samples which were received from the clinically diagnosed PID patients from Teerthankar Mahaveer Medical College and Hospitals from the year January 2012 to February 2013. Samples include urine, vaginal swabs, cervical swabs and endometrial specimen. The samples were immediately transported to Microbiology research laboratory. After enrichment, the cultures were inoculated on different selective and differential media and were incubated at 37°C required. The colony characters were screened and identified by conventional methods (Douglas *et al.,* 1991).

The inoculum was prepared by direct colony suspension method recommended in CLSI guidelines (CLSI, 1993). According to these, well isolated colonies were selected from 18 to 24 hours agar plate and inoculated in nutrient broth or saline suspension. The turbidity of suspension is adjusted to match the 0.5 McFarland turbidity standard. After adjusting the turbidity of the inoculum, a sterile cotton swab is dipped into the adjusted suspension. The agar plates were inoculated by streaking the swab over the entire sterile agar surface. The predetermined battery of antimicrobial discs was dispensed onto the surface of the inoculated agar plates.

The antibiotic discs used were

- B- lactams: Ampicillin, Penicillin, Cloxacillin, Carbenicillin
- Cephalosporins: Ceftriaxone
- Quinolones: Cotrimoxazole
- Aminoglycosides: streptomycin, gentamycin, Erythromycin
- Broad spectrum: tetracyclin, chloramphenicol
- Polymixin B: Colistin

Results and Discussion

In the present study total 100 clinical samples were analysed for the presence of different pathogens. Total 5 clinical isolates were isolated and further identified as *Staphylococcus aureus, Escherichia coli, Klebsiella* species, *Pseudomonas* species and Candida *albicans* in 76 (76%) cases while in 24 cases (24%) no pathogens were isolated.

Table 1 and figure 1 shows the most frequently isolated organism was *Staphylococcus aureus* accounting for 40.79% isolates followed by *Klebsiella* species and *Escherichia coli* in 25% and 13.15%, respectively while *Pseudomonas* species 7.90% & *Candida albicans* 13.15%.

It was observed that coliform organisms like *Klebsiella* species, *Escherichia coli* and *Pseudomonas* species were common. These are normal flora of the gut as the genital tract is in close proximity to the lower gastro intestinal tract with faecal flora. Similarly *Candida albicans* was also isolated among the clinical samples and analysed hence the antibiotic regimen for PID should also possess coverage for fungal pathogens.

In this study, none of the 100 samples analysed patients was positive for Gonococci. They are fastidious organism that cannot withstand any adverse condition.

Table 2 shows the distribution of bacteria species isolates according to age. Frequency

of occurrence was predominant with the age group 26–30 (51.31%).

This study contradicts the report of Crombleholme and Smith (1989) but in conformity with the report of Maruotti who concluded that PID is common among sexually active young women of age between 26-30 years.

Table 3 shows the association between the bacterial isolates and their antibiotic sensitivity patterns. It was found that *Staphylococcus aureus* was more sensitive to Gentamycin (91%), Erythromycin (90%) and cefuroxime (97%). Also, it was found that *Klebsiella* species was more sensitive to cefuroxime (95%), gentamycin (92%) and colistin (82%). While *Escherichia coli* was found to be more sensitive to gentamycin (91%) and streptomycin (77%). *Pseudomonas* species was found to be more sensitive to cefuroxime (96%), colistin (89%) and carbenicillin (94%).

According to this study, it was also found that among the aerobic pathogens isolated *Staphylococcus aureus* had the highest percentage. Therefore care should be taken by women to avoid contamination of their private parts with any object since, *Staphylococcus aureus* can adhere objects. This suggests a need to discover and provide coverage against all possible damaging PID pathogens and also to focus on long term morbidity in treatment efficacy evaluations.

The present study clearly indicates that the facilities both for isolating organisms and testing for their antibiotic sensitivity pattern are limited in developing countries, despite the well known complications associated with PID. This would make empirical antibiotic chemotherapy common, thus confounding further the problem of management. This may be overcome by establishing well-equipped regional centres that that could advise other centres of trends in pattern of isolates and antibiograms.

Table.1 Distribution of the different bacteria species isolated from patients in the gynaecological ward

Organism Isolated	**Total no. of Isolates**	**Percentage %**
Staphylococcus aureus	31	40.79
Klebsiella species	19	25.00
Escherichia coli	10	13.15
Pseudomonas species	6	7.90
Candida albicans	10	13.15
Total	**76**	**100.00**

Table.2 Distribution of bacteria species isolates according to age of patients

Age	**Number with growth**	**Percentage%**
15-20	6	7.90
21-25	20	26.31
26-30	39	51.31
31-35	9	11.84
36-40	2	2.63

Total	**76**	**100.00**

Table.3 Antibiotic Sensitivity rates(%) of isolated bacteria

Antibiotics	Staphylococcus *aureus*	Klebsiella *species*	Escherichia *coli*	Pseudomonas *species*	Susceptibility(%)
Ampicillin	22	71	50	-	47.7
Penicillin	28	-	-	-	28.0
Cloxacillin	71	-	-	-	71.0
Carbenicillin	-	-	-	94	94.0
Cefuroxime	97	95	-	96	96.0
Cotrimoxazole	-	54	50	-	52.0
Tetracyclin	37	21	27	-	28.3
Chloramphenicol	54	-	-	-	54.0
Gentamycin	91	92	91	73	86.8
Erythromycin	90	-	-	-	90.0
Streptomycin	27	46	77	-	50.0
Colistin	-	82	-	89	85.5

Fig.1 Distribution of the different bacteria species isolated from patients in the gynaecological ward

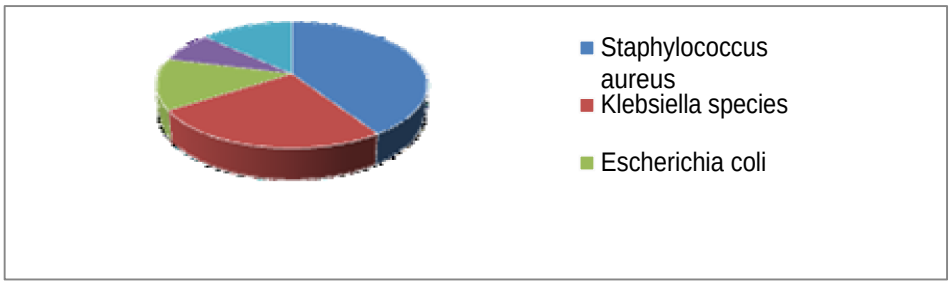
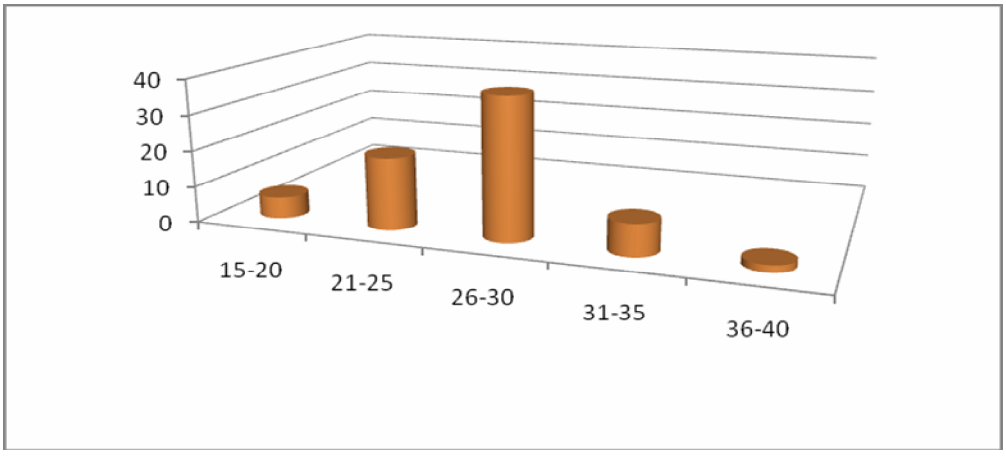


Fig.2 Distribution of bacteria species isolates according to age of patients



References

Bevan, C.D., Johal, B.J., Mumtaz, G., Ridgway, G.L., Siddle, N.C. 1995. Clinical, laparoscopic and microbiological findings in acute salpingitis: report on a United Kingdom cohort. *Br. J. Obstet. Gynaecol.*, 102: 407–14.

CDC, 2002. Sexually transmitted diseases treatment guidelines. *MMWR*, 55: 1–84.

Cohen, C.R., Manhart, L.E., Bukusi, E.A., Astete, S., Brunham, R.C., Holmes, K.K., *et al.* 2002. Association between *Mycoplasma genitalium* and acute endometritis. *Lancet*, 359: 765–6.

Douglas, Jr., J.M., Corvino, M.S., Verdon, C.A., Reichart, J.M., Ehret, The Gonorrhea Treatment Study Group, 1991. A comparison of single-dose cefixime with ceftriaxone as treatment for uncomplicated gonorrhea. *N. Engl. J. Med.*, 325: 1337–1341.

Finch, R. 2012. Current challenges in antimicrobial resistance and health care associated infections: role and organization of ARHAI. *J. Antimicrob. Chemother.*, 67(l): i3–i10

Hillis, S.D., Joesoef, R., Marchbanks, P.A., Wasserheit, J.N., Cates, W., Jr., Westrom, *et al.* 1993. Delayed care of pelvic inflammatory disease as a risk factor for impaired fertility. *Am. J. Obstet. Gynecol.*, 168: 1503–9.

Loscalzo, J., Andreoli, T.E., Cecil, R.L., Carpenter, C.A., Griggs, R.C. 2001. Cecil essentials of medicine. W.B. Saunders, Philadelphia.

Melvin, D.G. 1990. Optimum therapy for acute Pelvic Inflammatory disease. *Drugs*, 39(4): 511–522.

Morcos, R., Frost, N., Hnat, M., Petrunak, A., Caldito, G. 1993. Laparoscopic versus clinical diagnosis of acute pelvic inflammatory disease. *J. Reprod. Med.*, 38: 53–6.

National Committee for Clinical Laboratory Standards. 1993. Approved standard M7-A3. Methods for dilution antimicrobial susceptibility tests for bacteria that grow aerobically. National 1690 NOTES NOTIES 1691 Committee for Clinical Laboratory Standards, Villanova, Pa.

Pelvic Inflammatory Disease treatment at eMedicine.

STD Facts — Pelvic inflammatory disease (PID)". Retrieved 2007-11-23.

Sutton, M.Y., Sternberg, M., Zaidi, A., St Louis, M.E., Markowitz, L.E. 2005. Trends in pelvic inflammatory disease hospital discharges and ambulatory visits, United States, 1985–2001". *Sex Transm. Dis.*, 32(12): 778–84.

Templeton, A. (Ed.). 1996. Recommendations arising from the 31st study group: The prevention of pelvic infection. RCOG Press, London. Pp 267–70.