

Prevalence and Pattern of Bacterial Isolates in Cases of Pelvic Inflammatory Disease Patients at a Tertiary Hospital in Osogbo, Nigeria

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Abstract: This study was aimed at determining the microbial spectrum from endocervical swab cultures of patients with suspected pelvic inflammatory disease and their *in vivo* antibiotic sensitivity patterns. Endocervical swabs were collected from 100 patients attending a tertiary health institution in Nigeria. Bacteria isolates were characterized by standard protocol as described by Cowan and Steel and susceptibility tests were performed by Stokes's technique. Statistical analysis was made by simple percentages among related variables. About 70% of patients were positive for the infection; there were seven microbial organisms isolated with *Staphylococcus aureus* as the most commonly isolated organism in 41.4% of cases followed by *Klebsiella* species with (24.29%), *Escherichia coli* (12.86%), *Pseudomonas* species (8.57%) and *Candida albicans* (12.4%). Only thirteen antibiotic disks were used in testing for sensitivity of the isolated bacteria. Penicillin, ampicillin and tetracycline were the most frequently resistant antibiotics with 71, 52.7 and 71.7% resistance rates. The remaining ten antibiotics had >50% sensitivity rate. Age group 25-30 years were significantly more infected with bacteria than any other age group. Routine screening and treatment of women for lower genital tract infections to minimize their role in PID is recommended.

Key words: Pelvic inflammatory disease, bacteria, antibiotic susceptibility, genital tract, infertility

INTRODUCTION

Pelvic Inflammatory Disease (PID) describes inflammatory disorders of the upper female genital tract including endometritis, salpingitis, tubo-ovarian abscess and pelvic peritonitis (Bohm *et al.*, 2010). PID may be either symptomatic or subclinical both presentations can cause more serious sequelae including chronic pelvic pain, ectopic pregnancy and infertility (Wiesenfeld *et al.*, 2002). It usually arises as an ascending microbial infection from the lower genital tract, particularly the endocervix (Audu and Kudi, 2004). However, there are inherent defence mechanisms that protect the upper genital tract from microbial colonisation. The cell composition and gel structure of the cervical mucus makes it a mechanical barrier to ascending infection; it also possesses antibacterial activities which prevent bacterial ascent (Elstein and Chantler, 1989). Endometrial and oviductal secretions may also help to wash out bacteria from the upper genital tract. Despite these inherent defense mechanisms, bacterial pathogens still penetrate the cervical mucus and ascend into the endometrium and

endosalpinx causing PID. This may be aided by passive transport and by vectors such as spermatozoa and trichomonads (Keith *et al.*, 1984). Retrograde menstruation may also transport bacteria into the fallopian tubes while uterine instrumentation and insertion of IUCD can inoculate the endometrium.

The microorganisms that cause pelvic inflammatory disease may be divided into three broad groups: sexually transmitted diseases, respiratory pathogens and endogenous vaginal/bowel microbes (Soper, 1994). These organisms may be isolated through culture of swabs obtained from the endocervix, the pouch of Douglas via culdocentesis or laparoscopically from tubal exudates (Chow *et al.*, 1975; Peipert *et al.*, 1996; Henry-Suchet, 2000). There is polymicrobial aetiology in 30-40% of cases (Sweet *et al.*, 1981; Brunham *et al.*, 1988). In some populations, *Neisseria gonorrhoeae* remains the most common aetiological factor while in others it is *Chlamydia trachomatis* (Mardh *et al.*, 1981; Soper, 1994). Respiratory pathogens have been isolated in 5% of cases (Brunham *et al.*, 1988) with *Haemophilus influenzae* most commonly involved and associated with pyosalpinx

(Teisala *et al.*, 1990) due perhaps to the histological similarity between the respiratory and the upper genital tract (McGee and Pavia, 1991).

Microorganisms associated with bacterial vaginosis, predominantly anaerobes are the endogenous isolates often cultured (Soper, 1994). The epidemiology of PID in any region is of great importance in the institution of prompt and accurate treatment hence, preventing the sequelae associated with the disease. This is particularly important in areas where facilities for isolating the causative agents are either limited or lacking or the manpower to do so absent. The objective use of empirical chemotherapy (Newkirk, 1996) backed by epidemiological data becomes the main thrust of management in such situations or indeed while awaiting microbial culture and antibiotic sensitivity results.

The objectives of this study were to determine the commonly isolated microorganisms from endocervical swab cultures of patients with suspected pelvic inflammatory disease and to identify their *in vitro* responsiveness to tested antibiotics.

MATERIALS AND METHODS

This retrospective study was conducted at Ladoke Akintola University of Technology Teaching Hospital, Osogbo, between October 2008 and June 2009. Records of all requests for microbial culture and antibiotic sensitivity tests for suspected cases of pelvic inflammatory disease presenting with at least three of the following; pelvic vaginal discharge, lower abdominal pain, bilateral adnexal tenderness, uterine tenderness and cervical motion tenderness were retrieved and analysed using the SPSS statistical package. The information collected included the nature of the specimen, type and number of bacterial and/or fungi isolated and the spectra of activity to antibacterial agents. All samples collected were immediately processed routinely. Microscopy using wet preparation and Germ-tube test were performed to identify *Candida albicans* while the bacteria isolated were characterized by standard protocol as described by Cowan and Steel (1974). Susceptibility tests were performed by Stokes's technique (Stokes and Ridgway, 1987) modified slightly to include multidisks per plate. Isolates were considered sensitive or resistant (Akerele *et al.*, 2000).

RESULTS AND DISCUSSION

One hundred endocervical swabs were cultured. Table 1 shows that five different microorganisms were isolated (*Staphylococcus aureus*, *Escherichia coli*,

Table 1: Distribution of the different bacteria species isolated from patients in the gynecological and post natal ward

| Organisms isolated | Total No. of isolate | Percentage (%) |
|-------------------------------|----------------------|----------------|
| <i>Staphylococcus aureus</i> | 29 | 41.43 |
| <i>Klebsiella pneumoniae</i> | 17 | 24.29 |
| <i>Escherichia coli</i> | 9 | 12.86 |
| <i>Pseudomonas aeruginosa</i> | 6 | 8.57 |
| <i>Candida albicans</i> | 9 | 12.86 |
| Total | 70 | 100.00 |

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

| Age | Number with growth | Percentage (%) |
|-------|--------------------|----------------|
| 15-20 | 4 | 5.71 |
| 20-25 | 19 | 27.14 |
| 25-30 | 38 | 54.29 |
| 30-35 | 8 | 11.43 |
| 35-40 | 1 | 1.43 |
| Total | 70 | 100.00 |

Table 3: Antibiotic sensitivity rates (%) of isolated bacteria

| Antibiotic sensitivity | <i>Staph. aureus</i> | <i>Klebsiella sp.</i> | <i>E. coli</i> | <i>P. aeruginosa</i> | Susceptibility (%) |
|------------------------|----------------------|-----------------------|----------------|----------------------|--------------------|
| Ampicillin | 23 | 70 | 49 | - | 47.3 |
| Co-trimoxazole | - | 55 | 49 | - | 52.0 |
| Tetracycline | 35 | 23 | 27 | - | 28.3 |
| Chloramphenicol | 54 | - | - | - | 54.0 |
| Gentamicin | 90 | 92 | 90 | 75 | 86.8 |
| Erythromycin | 90 | - | - | - | 90.0 |
| Streptomycin | 25 | 48 | 77 | - | 50.0 |
| Penicillin | 29 | - | - | - | 29.0 |
| Cloxacillin | 70 | - | - | - | 70.0 |
| Cefuroxime | 97 | 94 | - | 95 | 95.3 |
| Fortum | 94 | 95 | - | 94 | 94.3 |
| Colistin | - | 84 | - | 87 | 85.5 |
| Carbenicillin | - | - | - | 94 | 90.0 |

Klebsiella pneumoniae, *Pseudomonas aeruginosa* and *Candida albicans*) in 70 (70%) cases while in 30 cases (30%) no pathogen was isolated. The most frequently isolated organism was *S. aureus* accounting for 41.43% (29/70) of isolates followed by *Klebsiella pneumoniae* and *Escherichia coli* in 24.29 and 12.86%, respectively while *Pseudomonas aeruginosa* (8.57%) and *Candida albicans* (12.86%). Distribution of bacteria species isolates according to age of patients is shown in Table 2. Frequency of occurrence was predominant with the age group 25-30 (54.29%).

The association between the bacterial isolates and their antibiotic sensitivity patterns is shown in Table 3. It was found that *Staphylococcus aureus* was more sensitive to gentamycin (90%), erythromycin (90%), cefuroxime (94%) and fortum (94%). Also, it was found that *Klebsiella pneumoniae* was more sensitive to fortum (95%), cefuroxime (94%), gentamycin (92%) and colistin (84%). While *Escherichia coli* was found to be more sensitive to gentamycin (90%) and streptomycin (77%). *Pseudomonas* species was found to be more sensitive to cefuroxime (95%), fortum (94%), colistin (87%) and carbenicillin (94%).

Pelvic Inflammatory Disease (PID) remains a major medical and public health problem for women of reproductive age. It is known to be the most common disease that always results to serious complication like infertility in women. It is the most common serious complications of sexually transmitted disease (Alder, 1992). Pelvic inflammatory disease is a clinical syndrome attributed to the ascending spread of micro-organisms. In this study, five types of aerobic pathogens were isolated viz; *Staphylococcus aureus*, *Klebsiella* species, *Escherichia coli*, *Pseudomonas aeruginosa* and *Candida albicans*. It was observed that coliform organisms like *Klebsiella pneumoniae*, *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.

In this study, none of the 100 samples analyzed from the patients was positive for gonococci. Although, cases of gonococci have been reported (Westrom, 1975), this was not found in this study probably because of this organism. They are fastidious organisms that can not withstand any adverse condition. Transport medium was not provided because of the limited numbers studied. It could be concluded that the patients studied were not infected with gonococci. In this study, it was discovered that poly-microbial infection was not common. This study therefore 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 25-30 years. According to this study, it was also found that among the aerobic pathogens isolated *Staphylococcus aureus* had the highest percentage of 29 (41.43%). Therefore care should be taken by woman to avoid contamination of their private part with any object since, *Staphylococcus aureus* can stick to some objects. Most of the patients studied during this study had gynecological cases and had infections due to the uses of contraceptive and Intrauterine Device (IUD). To this end, it is suggestive that all women of child bearing age should consult trained medical personnel before using contraceptive or IUD in order to avoid exposure of the genital tracts to these pathogens since, they can invade and damage vital organs in the body. All women who wish to undergo family planning should visit family planning clinic nearer to them for instructions. Clinical complications in patients studied in this research include primary and secondary infertility, abdominal pains, nausea and vomiting, foul smelling vaginal discharge. There was no maternal death due to PID during this study. This may be related to prompt and efficient management of

patients at the hospital and the awareness of the affected patients by reporting to the hospital early enough as soon as they noticed infection of PID either following abortion, use of IUD or contraception. From this study, it is found that all the bacteria isolates were sensitive to ampicillin gentamycin and all other cephalosporin generation used *in vitro*. Therefore, it is suggestive that those antibiotics should be considered as the drug of choice for the treatment of patients with Pelvic Inflammatory Disease (PID). Most of the complications of PID shows in this study can be minimized or prevented by prompt report to the hospital by sexually active women have PID infection following abortion (Oginni and Chukwudebelu, 1981).

CONCLUSION

In this study, the reported microbial-associated infection in PID with a prevalence of 70% is of public health importance. Early diagnosis of causative agents and prompt institution of chemotherapeutic agents will help to prevent clinical complications that are usually expensive to manage.

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