



ORIGINAL RESEARCH PAPER

Microbiology

ANTIBIOTIC SUSCEPTIBILITY PATTERN OF PSEUDOMONAS AERUGINOSA ISOLATED FROM PUS SAMPLES RECEIVED IN A TERTIARY CARE HOSPITAL IN CENTRAL INDIA.

**KEY WORDS:** Pseudomonas aeruginosa, drug resistance, AST pattern.

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ABSTRACT

**Introduction:** *Pseudomonas aeruginosa* is a major cause of nosocomial infection. Regional variations in the antibiotic resistance exist for different organisms. In recent years, a considerable increase in the prevalence of multidrug resistance (MDR) in *P. aeruginosa* has been noticed, leading to high morbidity and mortality. Therefore, this study was done to determine the status of antimicrobial resistance among *Pseudomonas aeruginosa*. **Materials and Methods:** The data was collected from laboratory retrospectively, sampled during March 2013 to February 2014. During this period of one year total of 110 *Pseudomonas aeruginosa* were isolated from 2500 pus specimens of patients admitted in different departments of M.Y.H. hospital. Identification was done by standard identification tests & antibiotic susceptibility testing were done as per CLSI guidelines. **Results:** We found that most of the *Pseudomonas aeruginosa* isolated from pus were resistant to Amoxicillin/Clavulanic acid(96%), Ampicillin/Sulbactam(95%), followed by Ceftazidime(62%), Cefipime(59%), Ciprofloxacin(56%), Levofloxacin(55%), Gentamycin(55%), Amikacin(50%), Aztreonam(45%), Piperacillin(45%), Piperacillin/Tazobactam(32%), Imipenem(23%), Meropenem(24%). **Conclusion:** Strict antibiotic policies wherein surveillance programmes for multidrug resistant organisms are in place and infection control procedures are properly implemented, are of immediate importance.

INTRODUCTION:

*Pseudomonas aeruginosa* is a major cause of nosocomial infection. It is one of the important cause of morbidity and mortality among hospitalized patients. Despite advances in sanitation facilities, improved hygiene in healthcare facilities and the introduction of a wide variety of antimicrobial agents with anti-pseudomonadal activities, life threatening infections caused by *Pseudomonas aeruginosa* continue to be a hospital infections.<sup>1,2</sup>

The microbial pathogens, as well as, their antibiotic sensitivity pattern, may change from time to time and place to place. Therefore knowledge of current drug resistance pattern of the common pathogenic bacteria in a particular region is useful in clinical practice. Its general resistance is due to a combination of factors.<sup>3</sup> It is intrinsically resistant to antimicrobial agents, due to the low permeability of its cell wall. It has the genetic capacity to express a wide repertoire of resistance mechanisms. It can become resistant through mutations in the chromosomal genes which regulate the resistance genes. It can acquire additional resistance genes from other organisms via plasmids, transposons and bacteriophages. In recent years, a considerable increase in the prevalence of multidrug resistance (MDR) in *P. aeruginosa* has been noticed, leading to high morbidity and mortality.<sup>4,5</sup>

Periodic testing and analysis of antibiotic resistance would enable the physicians to detect the trends in the resistance pattern to the commonly prescribed antibiotics in a given organism. Therefore, this study was done to determine the status of antimicrobial resistance among *Pseudomonas aeruginosa* and the magnitude of the multidrug resistance in these organisms.

MATERIALS & METHODS:

**Study Setting:** This study was conducted at the Microbiology department of MGM Medical College, Indore. **Inclusion criteria:** 110 *Pseudomonas aeruginosa*, isolated from pus specimens from admitted patients from various departments of M.Y.H. hospital, Indore during a period of 1 year.

Sample collection-

The data was collected from laboratory retrospectively, sampled during from March 2013 to February 2014. During this period of one year total of 110 *Pseudomonas aeruginosa* were isolated from 2500 pus specimens of patients admitted in different departments

of M.Y.H. hospital. Isolates were identified on the basis of their colony characters and standard biochemical tests.<sup>6</sup>

Antibiotic sensitivity testing of all isolates was done by Kirby-Bauer disc diffusion method for ciprofloxacin (5µg), levofloxacin (5µg), gentamicin (10µg), amikacin (30µg), aztreonam (30µg), ceftazidime (30µg), cefepime (30µg), piperacillin (100µg), piperacillin/tazobactam (100/10µg), imipenem (10µg) and meropenem (10µg) according to CLSIs guidelines.<sup>7</sup>

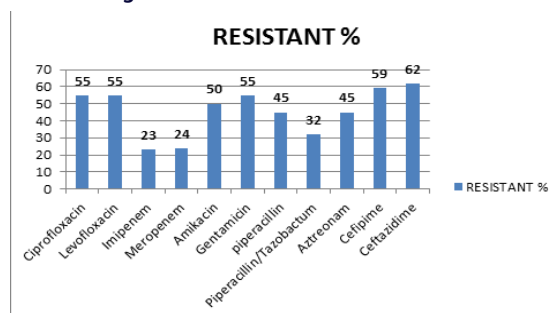
RESULTS:

Out of 2500 pus samples 110 *Pseudomonas aeruginosa* were isolated and tested for antibiotic sensitivity. Resistance of *Pseudomonas aeruginosa* to the tested antibiotics were maximum for cephalosporines Ceftazidime(62%) & Cefipime(59%), and was minimum for carbapenems Imipenem(23%) & Meropenem(24%).

Table. Antibiotic resistance Pattern (Total isolates; n =110)

Antibiotics	No. Of resistant isolates, n (%)
Ciprofloxacin	60 (55%)
Levofloxacin	60 (55%)
Ceftazidime	68 (62%)
Imipenem	25 (23%)
Meropenem	26 (24%)
Amikacin	55 (50%)
Gentamicin	61 (55%)
Piperacillin	50 (45%)
Piperacillin/tazobactam	35 (32%)
Aztreonam	50 (45%)
Cefipime	65 (59%)

Figure- Antibiotic resistance Pattern



**DISCUSSION:**

*Pseudomonas aeruginosa* causes serious infections, and is one of the leading causes of hospital acquired infections, several studies have been carried out to detect antibiotic sensitivity pattern for the various drugs available.<sup>8</sup> Ceftazidime are the commonest third generation antibiotics in hospital protocols and resistance to this antibiotic was significant in our study (62%) comparable with other studies in India. The increased prevalence of ceftazidime resistant *P. aeruginosa* is related to the increased use of beta-lactam antibiotics.<sup>8,9,10</sup>

*Pseudomonas aeruginosa* poses significant resistance to aminoglycosides. In our study, the rate of resistance to amikacin and gentamicin were 50% and 55% respectively. Anti-pseudomonadal effect of amikacin may be higher than gentamicin, and our data correlates with the other studies done in India<sup>9-11</sup>. Therefore, use of amikacin should be restricted to only severe nosocomial infections.<sup>12</sup>

We found that the resistance rates for fluoroquinolones i.e. ciprofloxacin and levofloxacin were 55% and 53% respectively. Resistance rates against imipenem (23%) and meropenem (24%) do not show much difference and resistance rate is higher compared to other studies.<sup>8-13</sup> Overall we have observed that there is increased antibiotic resistance which may be due to the selective pressure from the use of antimicrobial agents and is a major determinant for the emergence of resistant strains<sup>11,14</sup>.

This study shows that the clinical isolates of *Pseudomonas aeruginosa* are becoming resistant to commonly used antibiotics and gaining more and more resistance to even newer antibiotics. The antimicrobial agents are losing their efficacy because of the spread of resistant organisms due to indiscriminate use of antibiotics, lack of awareness, patient non-compliance and unhygienic condition.

**CONCLUSION:**

To prevent the spread of the resistant bacteria, it is important to have strict antibiotic policies wherein surveillance programmes for multidrug resistant organisms and infection control procedures need to be implemented. Our study helps the clinicians to decide on the empirical therapy for suspected pseudomonas infections before culture reports indicative of the drug of choice are available.

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