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# MULTIDRUG RESISTANT *PSEUDOMONAS AERUGINOSA* FROM DIFFERENT CLINICAL SAMPLES IN A TERTIARY CARE HOSPITAL

Microbiology

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## ABSTRACT

Multidrug resistant (MDR) *Pseudomonas aeruginosa* is being frequently implicated in healthcare associated infections (HAIs) in the recent years. The present study was undertaken to study the antibiotic susceptibility pattern in clinical isolates of *Pseudomonas aeruginosa* in a tertiary care hospital. Total 126 *P. aeruginosa* isolates from different samples were identified by standard biochemical tests. Antibiotic susceptibility patterns of all the isolates were performed by Kirby Bauer Disc Diffusion Method (KBDDM) to five antibiotics – Ceftazidime, Ciprofloxacin, Gentamicin, Imipenem and Meropenem. By KBDDM, maximum susceptibility was observed to imipenem (79.37%), followed by meropenem (77.78%). Susceptibility to ciprofloxacin was least (31.75%). Overall 37.3% strains of *P. aeruginosa* were MDRs.

## KEYWORDS

*P. aeruginosa* ; Multidrug resistant.

### Introduction

Treatment of infectious diseases is becoming more challenging with the passing years. We are now facing a growing population of multidrug resistant (MDR) bacteria, leaving clinicians with few or no therapeutic options. Amongst the Gram negative bacteria, MDR is usually seen in *Acinetobacter, Klebsiella spp., E. coli* and *Pseudomonas aeruginosa*[1]

*Pseudomonas aeruginosa* is a ubiquitous and versatile human opportunistic pathogen, frequently implicated in healthcare associated infections (HAIs), particularly in critically ill or immunocompromised patients. Therefore, this study was undertaken to detect antibiotic susceptibility pattern of various clinical isolates of Pseudomonas aeruginosa in a tertiary care hospital in Mumbai, by Kirby Bauer Disc diffusion method (KBDDM).

### Material and Methods

One hundred and twenty six laboratory confirmed isolates of *Pseudomonas aeruginosa* from different clinical samples received in this tertiary care hospital were included in this study. All isolates were identified as *P. aeruginosa* by standard biochemical tests[2]. Antibiotic susceptibility testing was done on Mueller Hinton Agar (MHA) plate by Kirby Bauer Disc Diffusion Method (KBDDM), according to Clinical Laboratory Standards Institute (CLSI) 2014 guidelines[3]. Antibiotics used were Ceftazidime (30µg), Ciprofloxacin (5µg), Gentamicin (10µg), Imipenem (10µg) and Meropenem (10µg). All discs were procured from Hi-Media Laboratories, Mumbai.

### Results

Majority of the isolates were from pus/wound swabs (53.17%), followed by urine samples (19.84%), as shown in Table 1. When these isolates were tested for antibiotic susceptibility by disc diffusion method, most isolates were susceptible to Imipenem (79.37%), followed by Meropenem (77.78%). Susceptibility to Ciprofloxacin was least (31.75%) (Bar Diagram 1). Total strains showing resistance to more than two antipseudomonal drugs (MDRs) were 47 out of 126 (37.3%).

### Discussion

In the recent years, there is a growing population of multidrug resistant bacteria (MDR), that threatens to move us into the "post-antibiotic era" of bacterial infectious diseases. *Pseudomonas aeruginosa* is responsible for morbidity, mortality and healthcare costs, and is also responsible for hospital associated infections (HAIs). Infections due to *Pseudomonas aeruginosa* is quite difficult to treat.

The present study was undertaken in patients admitted in a tertiary care hospital in Mumbai. In this study, 126 *P. aeruginosa* strains were included, which were isolated from different clinical samples. Antibiotic susceptibility testing was done by Kirby Bauer Disc Diffusion Method (KBDDM). Susceptibility to carbapenems was good – Imipenem (79.37%), followed by Meropenem (77.78%). Resistance to ciprofloxacin was high 68.25%, followed by ceftazidime (57.14%) and gentamicin (55.55%) (Bar Diagram 1).

In a study by Chander et al, *P. aeruginosa* isolates were 100% susceptible to imipenem and resistance to ciprofloxacin was only 27.59% [4], which is in contrast to the present study. In another study from Salem, resistance to ciprofloxacin was 63.1% and ceftazidime 57%, which is almost similar to this study but resistance to imipenem was 27%, which is slightly lower than the present study[5]. In a study by Kumar et al, resistance to ceftazidime was as high as 78%, followed by ciprofloxacin (59%), meropenem (40%), imipenem (32%) and gentamicin (73%)[6]. Resistance to ceftazidime, meropenem, genta micin and imipenem was much more in their study as compared to the present study.

In a study by Patel et al, resistance to ceftazidime and gentamycin was 67.86% each. Resistance to ciprofloxacin was 69.64%[7], which is comparable with the present study. As seen in the present study, they also observed that *P. aeruginosa* was less resistant to the carbapenem group of antibiotics like imipenem (21.43%) and meropenem (30.36%). In a study by Anupurba et al, resistance to ceftazidime was 46% and ciprofloxacin was 42%[8], which is much lower than the present study. This might be due to the environmental condition of this particular region, genetic background of the organism or frequent use of antibiotics among patients.

In a study by Laxmi et al[9], resistance to gentamycin, ciprofloxacin and ceftazidime was 18%, 25% and 42% respectively, which was comparatively less as compared to the present study. In another study by Ranjan et al, resistance to imipenem and meropenem was 23.1% and 29.6% respectively, whereas higher resistance was seen against ciprofloxacin (64%), ceftazidime (64.2%) and gentamicin (70.9%)[10]. In a study from Algeria, carbapenem resistance was only 18.35%, resistance to ceftazidime, gentamycin and ciprofloxacin was 56.25%, 21.75% and 43.75% respectively[11].

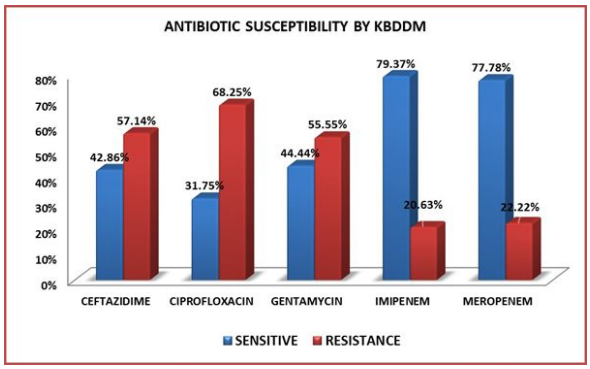
### Conclusion

The ever increasing multidrug resistance in *P. aeruginosa* leaves the clinicians with very few therapeutic options, with either polymyxin B or colistin, which have lot of side effects and also are not recommended in neonates and young children. Therefore, constant monitoring of antibiotic susceptibility pattern of *P. aeruginosa* is required in hospitals, along with judicious use of antibiotics and an effective hospital infection control policy.

**Table 1. Sample wise distribution of *Pseudomonas aeruginosa***

| Sample | Number (%) |
|---|---|
| Wound swab / pus | 67 (53.17%) |
| Urine | 25 (19.84%) |
| Sputum | 11 (8.73%) |
| Endotracheal (ET) aspirate | 06 (4.76%) |
| Ear swab | 06 (4.76%) |
| Tissue | 06 (4.76%) |
| Stool | 03 (2.38%) |
| Blood culture | 02 (1.59%) |
| **Total** | **126** |

**Bar Diagram 1**

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