

**ANTIBIOTIC RESISTANCE PATTERN IN PSEUDOMONAS AERUGINOSA ISOLATED AT A TERTIARY CARE HOSPITAL**Ambika Bhatiani<sup>1</sup>, Ashish Chandna<sup>2</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** Pseudomonas aeruginosa is one of the important bacterial pathogen isolated from various samples. It has the unique ability to infect all body systems. It is the leading cause of nosocomial infections particularly in burn patients, orthopaedic related infections, respiratory diseases, immunosuppressed and catheterized patients. The study was conducted at the Department of Microbiology, Rama Medical College Hospital and Research Centre, Kanpur, U. P. Clinical samples included ET suction, Pus, Urine, Blood and Body fluids. The isolates were identified by conventional methods. The strains were identified as P. aeruginosa based on colony morphology, gram staining, oxidase reaction, production of pyocyanin, citrate utilization test. Of the 280 samples subjected to culture sensitivity, 88 samples showed bacterial growth thereby suggesting 31.4% as the occurrence level. The percentage occurrence of Pseudomonas in these 88 samples was only 20.4% (18 samples), of which 10 samples (55.5%) and 08 samples (44.5%) were reported from males and females respectively. With the widespread use of antibiotics and the increase in number of immunosuppressed hosts, Pseudomonas aeruginosa has become a leading cause of gram negative bacterial infections especially in immuno suppressed patients who need prolonged hospitalization. The distribution of isolates is significantly affected by the type of hospital setting from where they are isolated. The occurrence level of bacterial infection was 31.4% and the percentage occurrence of Pseudomonas in these 88 samples was 20.4%. In our study, resistance to ceftazidime was 77.7% which is very close to a study from Gujarat with resistance values of 75%. Imipenem and Meropenem both showed 28.5% resistance which is in concordance with a study by Brown PD et al. The rate of multi drug resistance in P- aeruginosa is increasing in many parts of the world and it poses a serious threat. There is an urgent need for the development and up gradation of implementing and monitoring hospital infection control practices and the implementation of antibiotic policy in consultation with the infection control committees.

**KEYWORDS:** Antibiotic, Resistance, Nosocomial Infections.

**INTRODUCTION:** Pseudomonas aeruginosa is one of the important bacterial pathogen isolated from various samples. It has the unique ability to infect all body systems.<sup>1,2</sup>

It is the leading cause of nosocomial infections particularly in burn patients, orthopaedic related infections, respiratory diseases, immunosuppressed and catheterized patients. Despite therapy, the mortality due to nosocomial pseudomonal pneumonia is approximately 70%.<sup>3</sup>

Unfortunately, P-aeruginosa demonstrates resistance to multiple antibiotics, thereby jeopardizing the selection of appropriate treatment.<sup>4</sup>

Several different epidemiological studies indicate that antibiotic resistance is increasing in clinical isolates.<sup>5</sup> its general resistance is due to a combination of factors.<sup>6</sup>

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It is intrinsically resistant to antimicrobial agents due to the low permeability of its cell wall. 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.

The periodic analysis of antibiotic resistance would enable the physicians to detect the trends in the resistance pattern to the commonly prescribed antibiotic. Therefore, the present study was undertaken to find out the antibiotic resistance pattern of *Pseudomonas aeruginosa* from various clinical specimens.

**MATERIAL AND METHODS:** In this study, clinical specimen from ICU, wards and OPD's were included during the period from January to December 2014. A total of 280 clinical samples were received during this period. The study was conducted at the Department of Microbiology, Rama Medical College Hospital and Research Centre, Kanpur, U.P. Clinical samples included ET suction, Pus, Urine, Blood and body fluids.

The isolates were identified by conventional methods. The strains were identified as *P. aeruginosa* based on colony morphology, (i.e., large irregular, non-lactose fermenting colonies on MacConkey medium and pigmented colonies on nutrient agar) gram staining, oxidase reaction, production of pyocyanin, citrate utilization test. *P. aeruginosa* ATCC 27853 was used as the quality control.

Antibiotic sensitivity testing was performed by Kirby Bauer disc diffusion method and the results were interpreted according to the CLSI guidelines.<sup>7</sup>

The antibiotics which were tested were Ciprofloxacin (Ce), Gentamicin (G) , Ceftazidime (CZ), Piperacillin Tazobactam (PT), Cefoperazone Sulbactam (CS), Imipenem (I) and Meropenem (MR).

**RESULTS:** Of the 280 samples subjected to culture sensitivity, 88 samples showed bacterial growth thereby suggesting 31.4% as the occurrence level. The percentage occurrence of *Pseudomonas* in these 88 samples was only 20.4% (18 samples), of which 10 samples (55.5%) and 08 samples (44.5%) were reported from males and females respectively. Various specimens studied under the present investigation were endotracheal secretions, pus, urine, sputum, body tissues etc.

Sex	Total No.	Percentage (%)
Male	10	55.5
Female	08	44.5
Total	18	100

**Table 1: Gender wise distribution of Cases**

Name of Sample	No. of samples in which <i>P-aeruginosa</i> was Isolated
ET Suction / Sputum	12
Pus	04
Urine	02
Total	18

**Table 2: Isolation of *Pseudomonas aeruginosa* from Different Clinical Samples**

Antibiotic	Resistance
Ciprofloxacin (Ce)	47.6
Gentamicin (G)	57.1
Ceftazidime (CZ)	77.7
Piperacillin - Tazobactam (PT)	9.5
Cefoperazone Sulbactam (CS)	28.5
Imipenem (I)	28.5
Meropenem (MR)	28.5

**Table 3: Antibiotic Resistance of Pseudomonas aeruginosa Isolated from different Clinical Samples**

**DISCUSSION:** With the widespread use of antibiotics and the increase in number of immunosuppressed hosts, Pseudomonas aeruginosa has become a leading cause of gram negative bacterial infections especially in immuno suppressed patients who need prolonged hospitalization.<sup>8</sup>

The distribution of isolates is significantly affected by the type of hospital setting from where they are isolated. The occurrence level of bacterial infection was 31.4% and the percentage occurrence of Pseudomonas in these 88 samples was 20.4% which is comparable to the study of Javiya et al.<sup>9</sup>

In the present study, sex wise prevalence of clinical isolates show that infections caused by Pseudomonas aeruginosa are more common in males (55.5%) compared to females (44.5%). This is again in concordance with the study of Javia et. al. Rajat Rakesh et. al.<sup>10</sup>

The prevalence of the P. aeruginosa isolates varied with the clinical conditions and the specimens. The highest number of isolates was from endotracheal tubes (12) and pus (04). This is comparable to study by K. M. Mohanasoundaram.<sup>11</sup>

In different studies, the resistance of Pseudomonas to Ciprofloxacin has been reported in the proportion of 0.89%<sup>12</sup>. In our study, the overall resistance to ciprofloxacin was 47.6%.

Fourth generation cephalosporins are the most frequently prescribed agents in P. aeruginosa infections. In our study, resistance to ceftazidime was 77.7% which is very close to a study from Gujarat with resistance values of 75%.<sup>9</sup> increased use of beta lactam antibiotics such as amoxicillin and ceftazidime may be the reason for this increase in resistance.

In our study, Gentamicin showed 57.1% resistance which is comparable to studies by Rajat et. al.<sup>10</sup> K.M. Mohanosoundram.<sup>11</sup> showing resistance of 63% and 58.9% respectively.

Imipenem and Meropenem both showed 28.5% resistance which is in concordance with a study by Brown PD et. al.<sup>13</sup>

The rate of multi drug resistance in P-aeruginosa is increasing in many parts of the world and it poses a serious threat. There is an urgent need for the development and up gradation of implementing and monitoring hospital infection control practices and the implementation of antibiotic policy in consultation with the infection control committees.

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