



## SENSITIVE DRUGS AGAINST *PSEUDOMONAS AERUGINOSA* INFECTION IN RURAL REGION OF RAJASTHAN

### KEYWORDS

*Pseudomonas aeruginosa*, Polymyxin-B, Colistin, Piperacillin, Tazobactam, Cefepazone and Salbactam.

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### ABSTRACT

**OBJECTIVES:** Isolation and identification of *P.aeruginosa* from various clinical samples and also study the antibiotics sensitivity pattern.

**INTRODUCTION:** *Pseudomonas aeruginosa* is non fermentative gram negative bacilli and frequently causes nosocomial infections which are complicated and can be life-threatening. Polymyxin-B and Colistin are Polypeptide antibiotics which is effective against *P.Aeruginosa* infection. Imepenem is metalobeta lactamase. And few others drugs are also effective against the infection.

**MATERIAL & METHOD:** All clinical samples were processed immediately under standard protocol for routine culture. Blood agar, Nutrient agar are used for both culture characteristic and pigment production, Gram staining, Hanging drop test for motility, oxidase test, etc. used for the identification of the *P.aeruginosa*. And antibiotic sensitivity test for the sensitivity against drugs.

**RESULT:** Polymyxin-B and Colistin showed higher degree of sensitivity followed by other drugs. Piperacillin/Tazobactam and Cefepazone/Salbactam also have higher sensitivity among combination of drugs against infections caused by *P.aeruginosa*.

**CONCLUSION:** Polymyxin B and Colistin are most effect against skin, eye and ear infections whereas Piperacillin/Tazobactam and Cefepazone/Salbactam are also against infections against *P.aeruginosa*.

### INTRODUCTION:

*Pseudomonas aeruginosa* is non fermentative gram negative bacilli which is aerobic, non-spore forming bacilli that either do not use carbohydrate as a source of energy or degrade them through metabolic pathways other than fermentation.<sup>1</sup> *Pseudomonas aeruginosa* is frequent cause of nosocomial infections which are complicated and can be life-threatening.<sup>2</sup> *Pseudomonas aeruginosa* is responsible for 16% of nosocomial pneumonia<sup>3</sup>, 12% of hospital acquired urinary tract infection<sup>4</sup>, 10% blood stream infections<sup>5</sup> and 8% surgical wound infections.<sup>6</sup>

*P.aeruginosa* is an ubiquitous and versatile human opportunity pathogen and implication on morbidity, motility and health care caused both in host. The development of resistant against antibiotics infection caused by *P.aeruginosa* are life threatening and difficult to treat because it's highly intrinsically resistance to many antimicrobial. Frequent and prolonged antibiotics courses are likely to be major factor of highly antibiotic resistant of *P.aeruginosa*. mainly beta lactam and aminoglycosidase not highly resistance to *Pseudomonas aeruginosa*. In beta lactam imipenem and meropenem (carbapenem) highly susceptible to *Pseudomonas aeruginosa*. Our aim was to Isolation and identification of *P.aeruginosa* from various clinical samples and also study the antibiotics sensitivity pattern.

**METHODOLOGY:** A total of 300 positive samples have been taken from various hospitals in northern region of India. Collection of the samples from various clinical specimens include Urine, Body fluids, Pus, Sputum, Swabs, ET secretion, Ear swabs etc. Samples were collected from the patient of outpatients departments and inpatient department at various hospitals. Baseline data was collected, enclosed Performa was filled. Each specimen was assigned a unique number that links a specimen to patient with aseptic precautions and transported to the Microbiology laboratory for further testing. The organism that grew as non lactose fermenter on Macconkey agar and produce alkaline reaction in TSI was provisionally considered as *Pseudomonas aeruginosa*.

All clinical samples were processed immediately and routine culture as per standard protocol:

1. Culture characteristic: Nutrient agar, 5% Blood agar and Macconkey agar

2. Pigment production: Blood agar and Nutrient agar
3. Morphology and Gram's stain
4. Motility: Hanging drop preparation.
5. Catalase test
6. Oxidase test
7. Indole, Methyl red, Voges-Proskauer, Citrate utilization test, Urease test, and Triple sugar iron reaction.

### Antibiotic sensitivity testing:

Antibiotic susceptibility testing was performed by modified Kirby-Bauer disc diffusion method. The zone of inhibition obtained was measured and recorded as compared to that of the manufacturer interpretation charts according to the guidelines of the Clinical and Laboratory Standards Institute (CLSI).



Figure 4.6:- Antibiotic sensitivity pattern of *Pseudomonas aeruginosa*.

### RESULT AND DISCUSSION:

This present study shows, 300 positive samples of *Pseudomonas aeruginosa* were isolated from various clinical specimens of patients and antibiotic sensitivity pattern was studied.

TABLES 1 : Antibiotic Sensitivity Pattern of *Pseudomonas aeruginosa*

| Antibiotic Sensitivity Pattern | <i>Pseudomonas aeruginosa</i> (n=300) | Percentage (%) |
|--------------------------------|---------------------------------------|----------------|
| Amicillin                      | 0                                     | 0              |
| Amikacin                       | 93                                    | 62             |
| Cefotaxime                     | 57                                    | 38             |
| Ceftazidime                    | 63                                    | 42             |
| Ceftriaxone                    | 60                                    | 40             |

|                           |     |    |
|---------------------------|-----|----|
| Piperacillin/Tazobactam   | 135 | 90 |
| Polymyxin-B               | 147 | 98 |
| Colistin                  | 147 | 98 |
| Aztreonam                 | 60  | 40 |
| Tobramycin                | 90  | 60 |
| Ciprofloxacin             | 84  | 56 |
| Cefepime                  | 117 | 68 |
| Cefepiparazone/Salbutctum | 129 | 86 |
| Meropenem                 | 126 | 84 |
| Imipenem                  | 138 | 89 |

As shown in table 1: Out of 300 isolates of *Pseudomonas aeruginosa*, maximum sensitivity against Polymyxin-B 98%, Colistin 98%, Imipenem 89%, Cefepiparazone/Salbutactum 86%, Meropenem 84%, Piperacillin/Tazobactam 82%, Ciprofloxacin 72%, Cefepime 80%, Amikacin & Colistin 62% each, Tobramycin 60%, Cefazidime 42%, Ceftriaxone and Aztreonam 40% each, Cefotaxime 38% and Ampicillin show no sensitivity.

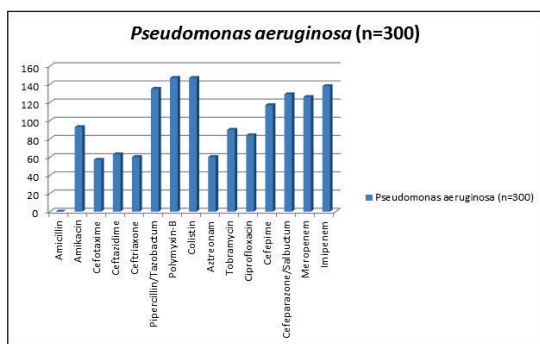


FIGURE 2: Antibiotic Sensitivity Pattern of *Pseudomonas aeruginosa*

In our present study *Pseudomonas aeruginosa* showed no sensitivity to Ampicillin which was correlate to Kalantar et al. (2013)<sup>7</sup> and Farida A et al. (2010)<sup>8</sup>. In present study *Pseudomonas aeruginosa* showed Sensitivity 62% against Amikacin which was comparable to other study by Kumar V et al. 2011<sup>9</sup> showed 68% other study reported lower sensitivity to Amikacin against *Pseudomonas aeruginosa* such as Usha K et al 2013<sup>10</sup> to be 38%. In present study *Pseudomonas aeruginosa* showed Sensitivity 38% against Cefotaxime, it was lesser than study done by Usha K et al 2013<sup>10</sup> 55%

In present study *Pseudomonas aeruginosa* showed Sensitivity 42% against Cefazidime which was comparable to other study 41% by Sharma et al 2010.<sup>11</sup> The higher sensitivity were shown in the studies Usha K et al 2011<sup>10</sup> to be 55%, Kumar V et al. 2011<sup>9</sup> to be 70%. In the present study Ceftriaxone was found to be 40% sensitivity against *Pseudomonas aeruginosa*. It was comparable to other study of Chander A et al 2013<sup>12</sup> 31.04%. In the present study Piperacillin/Tazobactam show 82% sensitivity against *Pseudomonas aeruginosa* higher sensitivity was shown by Kumar V et al 2012<sup>9</sup> 100%.

In the present study Polymyxin show 98% sensitivity against *Pseudomonas aeruginosa*. Lower sensitivity shown by Farida et al 2010<sup>8</sup> had reported 80%. In the present study *Pseudomonas aeruginosa* showed Sensitivity 40% against Aztreonam sensitivity which is correlate to Usha K et al 2013<sup>10</sup> 43%. The study of Goel et al 2014<sup>13</sup> show lower sensitivity 5.1%. In the present study *Pseudomonas aeruginosa* showed Sensitivity 60% against Tobramycin which is correlate to study Islahi S et al 2014<sup>14</sup> 69.3%.

In the present study *Pseudomonas aeruginosa* showed sensitivity 56% against Ciprofloxacin which is comparable to Kumar V et al 2012<sup>9</sup> 63%. Lower sensitivity shown by Franco et al 2010<sup>15</sup> had reported 14.5%. In the present study *Pseudomonas*

*aeruginosa* showed sensitivity 68% against Cefepime. Lower sensitivity shown by Juyal D et al 2013<sup>16</sup>. In the present study *Pseudomonas aeruginosa* showed sensitivity 86% against Cefepiparazone/Salbutactum. Lower sensitivity shown by Juyal D et al 2013<sup>16</sup> 39.36%

In the present study *Pseudomonas aeruginosa* showed sensitivity 84% against Meropenem which was correlate to Rajput A et al 2013.<sup>17</sup> In the present study *Pseudomonas aeruginosa* showed sensitivity 89% against Imipenem which was correlate to Rajput A et al 2013.<sup>17</sup> D' souza et al 2014 show 91.5% sensitivity. Imipenem show 89% sensitivity which is correlate to Kumar V et al 2013<sup>17</sup> which show 100% sensitivity and also similar to Jacobson et al 1995.

#### CONCLUSION:

These findings suggest that Polymyxin B and Colistin are most effect against skin, eye and ear infections whereas Piperacillin/Tazobactam and Cefepiparazone/Salbutactum are also against infections against *P.aeruginosa* which is the useful for clinicians.

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