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Antibiotic Resistance in *Pseudomonas aeruginosa* Strains Isolated from Various Clinical Specimens

K. Shirisha and R. Shyamala[*]

Department of Microbiology, Malla Reddy Medical College for Women, Hyderabad, Telangana, India

*Corresponding author

A B S T R A C T

Pseudomonas aeruginosa is primarily an opportunistic pathogen that causes infections in hospitalized patients particularly in burn patients where the skin host defences are destroyed, orthopaedic related infections, respiratory diseases, immunosuppressed and catheterised patients. Clinical samples i.e., pus, urine, blood, sputum, CSF, throat swab, pleural fluid were collected from inpatients and out patients attending SVS Hospital Mahabubnagar during the period of 1-6-2009 to 31-01-2010. The specimens were inoculated on Nutrient agar, Blood agar, and MacConkey agar and selective medium as cetrimide agar and incubated aerobically overnight at 37degree Centigrade for 24 hours and then examined next day for growth. *Pseudomonas aeruginosa* was isolated from the following samples: - 24 samples from pus (48%), 11 samples from urine (22%), 5 samples from blood (10%), 4 samples from sputum (8%), 3 samples from pleural fluid (6%), 2 samples from throat swab (4%) and 1 sample from CSF (2%). Isolation of *Pseudomonas aeruginosa* was highest in pus (48%). Maximum resistance (94%) was observed with piperacillin followed by amoxyclav and carbencillin. High resistance of *Pseudomonas aeruginosa* against various commonly used antibiotics showed the alarming situation. The control of drug resistant *Pseudomonas aeruginosa* required rational prescribing and proper use of antibiotics.

Introduction

Pseudomonas aeruginosa is primarily an opportunistic pathogen that causes infections in hospitalized patients particularly in burn patients where the skin host defences are destroyed, orthopaedic related infections, respiratory diseases, immunosuppressed and catheterised patients. It may be the cause of the chronic debilitating pulmonary infection, which is one major cause of death in patients with cystic fibrosis (Jamshaid Alikhan *et al.,*

2008). The organism enters into the blood, causing sepsis that may spread to the skin and lead to the ecthyme gangrenosum, the black necrotic lesion.

Several external otitis skin lesions occur in swimming pools and hot tubs users, particularly where chlorination is inadequate. *Pseudomonas aeruginosa* is most common cause of osteochondritis of the foot, corneal infections caused by contact lens users, corneal ulceration, endocarditis.

Infections due to *Pseudomonas aeruginosa* are seldomly seen in healthy adults but in last two decades the organism has become increasingly recognized as the etiological agent in a variety of serious infections in hospitalized patients with impaired immune defense including HIV infections (Jamshaid Alikhan *et al.,* 2008).

Pseudomonas aeruginosa shows intrinsic and acquired resistance to many structurally unrelated antibiotics.

Previous exposure to antibiotics often leads to multidrug resistant *Pseudomonas aeruginosa* strains.

Because of these facts, it is of crucial importance to isolate and identify the offending strain. It is imperative that local surveillance with antibiograms be implemented to guide the current use of antibiotics (Abdi- Ali *et al.,* 2007).

Materials and Methods

Clinical samples i.e., pus, urine, blood, sputum, CSF, throat swab, pleural fluid were collected from inpatients and out patients attending SVS Hospital Mahabubnagar during the period of 1-6-2009 to 31-01-2010.

The specimens were inoculated on Nutrient agar, Blood agar, and MacConkey agar and selective medium as cetrimide agar and incubated aerobically overnight at 37degree Centigrade for 24 hours and then examined next day for growth.

Out of these cultures 50 samples were showing non-lactose fermenting colonies from MacConkey were identified by doing a battery of tests as follows.

Gram stain for Morphology
Hanging drop for motility
Study of cultural characters

Blood agar -37 Degree Centigrade

MacConkey Agar – 37 Degree Centigrade

Nutrient Agar – Both 37 & 42 Degree Centigrade

Cetrimide Agar – 25 Degree Centigrade

Catalase test
Oxidase test
Urease test
Arginine dihydrolase
Nitrate reduction
Citrate test
Gelatine liquefaction
Indole production
O-F Test
Glucose
Lactose
Maltose
Sucrose
Mannitol
Xylose
Methyl red test
Voges – Proskauer test
TSI (C.P. Baveja)

Antibiotic sensitivity testing by Kirby- Bauer Disc Diffusion Method.

Results and Discussion

Pseudomonas aeruginosa was isolated from the following samples:-

24 samples from pus (48%)
11 samples from urine (22%)
5 samples from blood (10%)
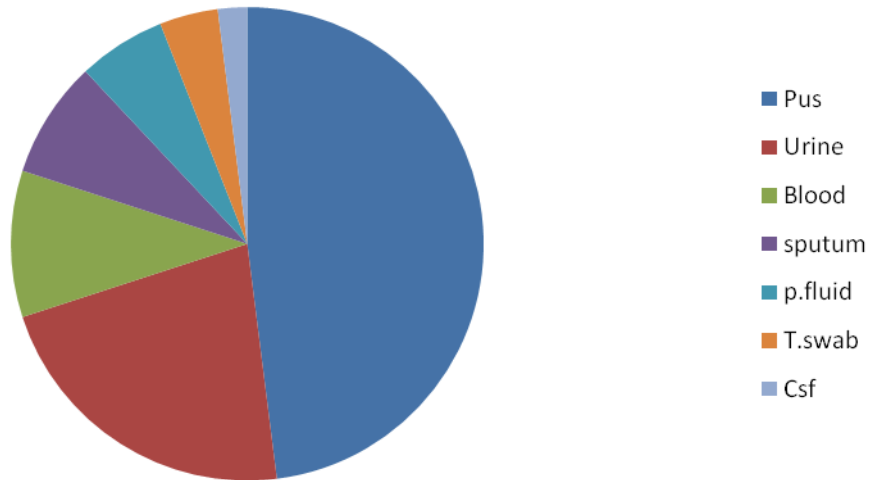4 samples from sputum (8%)
3 samples from pleural fluid (6%)
2 samples from throat swab (4%)
And 1 sample from CSF. (2%)

Isolation of *Pseudomonas aeruginosa* was highest in pus (48%) (Table 1).
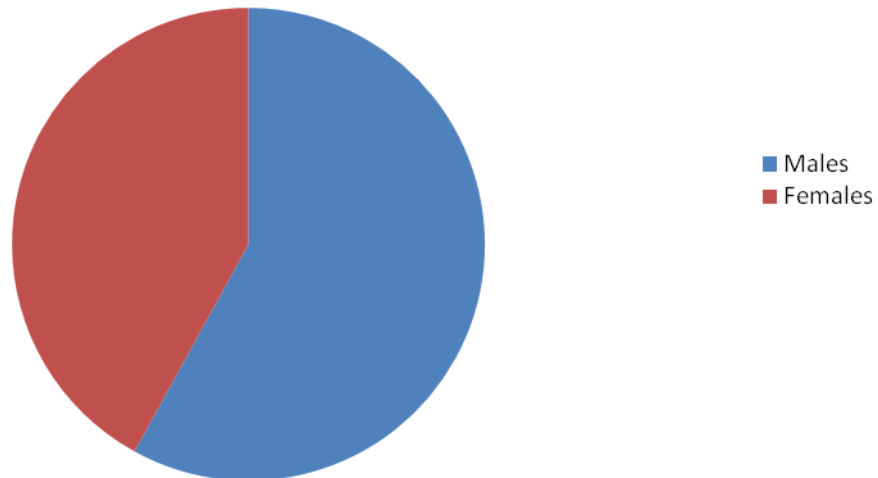
Table.1 *Pseudomonas aeruginosa* isolated from various clinical samples

Pus	Urine	Blood	Sputum	Pleural fluid	Throat swab	CSF
Number and Percentage						
24 & 48%	11 &22%	5 & 10%	4 & 8%	3 & 6%	2 & 4%	1 & 2%

Table.2 Antibiotic sensitivity pattern of *Pseudomonas aeruginosa*

S. No	Antibioitcs	Sensitive	Resistance
1.	Amoxyclav	5	45
2.	Amikacin	36	14
3.	Gentamycin	36	14
4.	Ciprofloxacin	26	24
5.	Piperacillin	3	47
6.	Carbencillin	5	45
7.	Ofloxacin	19	31
8.	Nalidixic acid	9	41
9.	Ceftazidime	21	29

Incidence of *Pseudomonas aeruginosa* in relation to gender

Male: Female ratio

The incidence of *Pseudomonas aeruginosa* in relation to gender is as follows:-

58% in Males and 42% in Females

Maximum resistance (94%) was observed with piperacillin followed by amoxyclav and carbencillin.

In this study the isolation of *Pseudomonas aeruginosa* was found to be maximum from pus (48%), which was same as in other studies (Brown *et al.,* 2004; Taneja *et al.,* 2004).

The incidence of *Pseudomonas* was found to be more in males (58%).

Females (42%), with male female ratio 1.38:1. Many other studies were tallying with our observations (Aliya Rashid *et al.,* 2007) (Mehta *et al.,* 2001).

Incidence of *Pseudomonas* was found to be highest in the age groups of 41-40 years (34%), followed by 21-30 Years (34.7%), according to few other studies (Mehta *et al.,*

2001). In the present study the isolates were found to be more in hospital acquired infection (66%), rather than in community acquired infections (34%)which was same as in other studies (Aliya Rashid *et al.,* 2007).

Antibiotic resistance was observed to be maximum with piperacillin (94%), followed by amoxyclav and carbenicillin. Other antibiotics tested showed resistance ranging from 28% to 82%. Earlier studies in 2001 revealed 16% resistance to piperacillin (Mehta *et al.,* 2001).

High resistance of *Pseudomonas aeruginosa* against various commonly used antibiotics showed the alarming situation. The control of drug resistant *Pseudomonas aeruginosa* required rational prescribing and proper use of antibiotics (Table 2).

The study group comprised of inpatients and out patients attending various departments of S.V.S Hospital Mahabubnagar. During the period of 1-6-2009 to 31-01-2010. Samples like pus, urine, blood, sputum, pleural fluid, throat swab, and CSF were processed in the department of Microbiology SVS Medical College. 50 isolates of *Pseudomonas aeruginosa* were then identified and characterised by a battery of tests. Maximum isolation of organism was from pus (48%).

Incidence was slightly more in males than females. Isolation was predominant in age groups ranging from 41-50 years. Association of *Pseudomonas aeruginosa* infection was found to be in hospital acquired infections rather than community acquired infections. Antibiogram revealed the development of drug resistance like piperacillin and amoxyclav and carbenicillin. The number of multidrug resistant strains have increased in recent years due to inadvertent and indiscriminate use of antibiotics.

The control of drug resistant *Pseudomonas aeruginosa* required rational prescribing and proper use of antibiotics.

References

Abdi-Ali, A., *et al.,* Study of Antibiotic Resistance by Efflux in Clinical Isolates of *Pseudomonas aeruginosa* Pak. J of Biological Sciences 10(6): 924-927, 2007

Aliya Rashid *et al.,* Infections by *Pseudomonas aeruginosa* and antibiotic Resistance Pattern of the isolates from Dhaka Medical College Hospital Bangladesh J Med Micro 2007; 01(02): 48-51.

Baveja, C.P. Textbook of Microbiology, 2nd Edition, pg 50-55

Brown P D *et al.,* Antibiotic resistance in clinical isolates of *Pseudomonas aeruginosa* in Jamaica. Rev Panam Salud Publica. 2004; 16(2): 125-30

Jamshaid Alikhan, *et al.,* Prevalence and Resistance pattern of *Pseudomonas aeruginosa* against various antibiotics Pak. J. Pharm. Sci., Vol.21, No3, July 2008, pg 311-15

Mehta, M., *et al.,* Antibiotic resistance in *Pseudomonas aeruginosa* strains isolated from various clinical specimens Indian journal of Medical Microbiology. 2001 19 (4): 232

Taneja N *et al.,* Prospective study of hospital acquired infections in burn patients at a tertiary care referral centre in North India. Burns 2004; 30: 665-669