

# Prevalence and Antibiogram of *Pseudomonas aeruginosa* in a Tertiary Care Hospital of Haryana

Sameena Khan<sup>1</sup>, Ruby Naz<sup>2</sup>, Ruchi Girotra<sup>3</sup>, A K Malik<sup>4</sup>

<sup>1,2,3</sup>Demonstrator Microbiology, SHKM Govt Medical College and Hospital Nalhar, Mewat, Haryana, , India

<sup>3</sup>Professor and Head of Department Microbiology, SHKM Govt Medical College and Hospital, Nalhar Mewat, Haryana, India

## ABSTRACT

*Pseudomonas aeruginosa* (*P. aeruginosa*) is a well-known invasive pathogen that can frequently cause severe infections in hospitalized patients. A major problem with *P. aeruginosa* infection may be that this pathogen exhibits a high degree of resistance to broad spectrum antibiotics. The main aim of this study is to know the prevalence of *P. aeruginosa* infection and its antibiogram in a tertiary care hospital. A total of 100 isolates of *P. aeruginosa* were isolated from different clinical samples using standard conventional techniques for six months, from June 2015 to December 2015. Antibiotic susceptibility testing was done by using Kirby-Bauer disc diffusion method as per CLSI guidelines. In our study, highest resistance was observed for Cefuroxime (87%) and least resistance for Amikacin and Gentamicin (5% and 14%) respectively. The most effective antibiotics were Colistin, Polymyxin B.

**Keywords :** Antibiotics , Resistance, *P. Aeruginosa*

## I. INTRODUCTION

*Pseudomonas aeruginosa*, is a pathogen associated with a wide range of nosocomial infections that adversely contributes to morbidity, mortality and increase in healthcare costs. Strains of *P. aeruginosa* cause disease in hospitalized patients, predominantly pneumonia, urinary tract infections, as well as skin and soft tissue infections[1]. They are mostly saprophytic, being found in water, soil, skin flora and most man-made moist environments[2] [3]. At one time, infections due to *P. aeruginosa* were only limited to immunocompromised patients but lately there has been an increase in their occurrence in immunocompetent subjects as well[4]. Therefore the present study was performed to know the antibiotic susceptibility patterns of *Pseudomonas aeruginosa* isolates from various specimens in our hospital.

## II. METHODS AND MATERIAL

The study was conducted in the Dept. of Microbiology, SHKMC, Mewat, Haryana from June 2015 to December 2015. A total of 100 *P. aeruginosa* isolates obtained from various samples such as urine, pus and wound swab, catheter tips as well as blood were analyzed. The samples were inoculated on Nutrient Agar, MacConkey's Agar, and Blood Agar and incubated overnight at 37°C under aerobic conditions. *P. aeruginosa* was initially identified by its colony characteristics, grape like odour, gram staining (gram negative bacilli). Oxidase positivity, motility. They were further identified and classified based on their biochemical profile and pigment production [1]. Antimicrobial susceptibility test was carried out on isolated and identified colonies of *P. aeruginosa*. Commercially prepared antibiotic disk (HiMedia) were used on Mueller Hinton agar plates by Kirby Bauer disk diffusion method, according to the Central Laboratory Standards Institute (CLSI) guidelines[5]. The standard strain of *P. aeruginosa* (ATCC 27853) was used as a

control. Antibiotics used in our study were Amikacin (30 µg), gentamicin (10µg), cefepime (30 µg), imipenem (10 µg), Aztreonam( 30 µg ), Polymixin B( 300units ), ceftazidime (30 µg), Piperacillin (100 µg), Piperacillin/Tazobactam (100/10 µg), Ciprofloxacin (10 µg), Levofloxacin (5µg ) and Colistin(10µg). The results were interpreted according to Clinical and Laboratory Standards Institute (CLSI) guidelines.

### III. RESULTS AND DISCUSSION

#### Results:

During the study total of 100 *P. aeruginosa* isolates obtained from various clinical samples were included. The isolates were most commonly found in pus (37) and sputum (17). Antibiogram demonstrated that less number of strains were resistant to amikacin and gentamicin (5% and 14%). All strains were found to be sensitive to colistin (100%) and Polymixin B (100%). *P. aeruginosa* isolates were found more in males.

**Table 1 :** Prevalence of *P. aeruginosa* based on sex (n=100)

S. no	Sex	Number
1	Male	58
2	Female	42
	Total	100

**Table 2 :** Distribution of organism according to age and sex

Age in year	Male	Female	Total	percentage
0-20	17	14	31	31
21-40	12	9	21	21
41-60	16	13	29	29
>60	13	12	25	25
	58	42	100	

**Table 3 :** Various Samples from which *P. aeruginosa* was isolated.

S. no	Clinical Samples	No of isolates
1	Urine	9
2	Blood	13
3	Pus	37

4	Sputum	17
5	Wound swab	12
6	Endotracheal tube	1
7	Ear swab	11

**Table 4 :** Antibiotic Sensitivity pattern of *P. aeruginosa* from various clinical samples(n=100)

Sr.No	Antibiotics	No of Sensitive isolates(%)	No of resistant isolates(%)
1	Amikacin(AK)	95	5
2	Gentamicin(GM)	86	14
3	Cefepime	21	79
4	Imipenem(IMP)	88	12
5	Aztreonam(AT)	60	40
6	Polymyxin B	100	0
7	Ceftazidime(CZ)	56	44
8	Piperacillin(PC)	75	25
9	Piperacillin/Tazobactam(PT)	87	13
10	Ciprofloxacin	75	25
11	Levofloxacin	91	9
11	Colistin	100	0

#### Discussion:

*P. aeruginosa* is the most common and dreadful gram negative bacilli found in various health care associated infections. The bacterial resistance has been increasing and this has both clinical and financial implication in treatment of patients. Therefore presence of *Pseudomonas* in clinical specimens is of great importance and hence this study was conducted. In this study, majority of the *P. aeruginosa* isolates were obtained from pus (37%) followed by Sputum(17%) as reported by Vijaya Chaudhari et al. , (35. 3%) [6] and Okon et al. , (39. 2%)

In the present study highest resistance was observed for Cefepime( 79% ). At the same time least resistance was seen in Amikacin and Gentamicin indicative of them to be better drugs in treating *Pseudomonas* infections. Similar results were shown by studies of Ravichandran Prakash et al. , *P. aeruginosa* is notorious and shows resistance to many antimicrobial agents [7]. Many isolates showed susceptibility towards Quinolones (ciprofloxacin, levofloxacin).

Piperacillin+Tazobactam combination showed a lower resistance of 17%, which makes this the preferred option against *P. aeruginosa* infections.

All strains were sensitive to Colistin ( 100% ) and Polymyxin B(100%). In our study, males showed a higher rate of pseudomonas prevalence as compared to females. Similar results were shown by Siti Nur et al. , (57%) [8] and Anupurba et al. , (60%) [9] and Rajat et al[10].

#### IV. CONCLUSION

*P. aeruginosa* is one of the most challenging nosocomial pathogen, particularly because of significant changes in microbial ecology due to indiscriminate use of antibiotics and lack of new antimicrobials. It has an ability to rapidly disseminate within an institution that poses threat to infection control efforts, especially if their existence is not detectable by simple, routine laboratory techniques. Furthermore, infections with such strains may result in poor or untoward clinical outcomes leading to the spread of multidrug resistance as a global problem. Judicious use of antibiotics following a proper antibiotic policy and vigilant infection control measures is the best way to control spreading of this superbug.

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