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Antibiotic Resistance among *Pseudomonas aeruginosa* Isolated in Tertiary Care Hospital, Vijayapur, India

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A B S T R A C T

The rapid increase of drug resistance in clinical isolates of this opportunistic human pathogen is of worldwide concern. Unfortunately, *Pseudomonas aeruginosa* demonstrates resistance to multiple antibiotics, thereby jeopardizing the selection of appropriate treatment. The current study was undertaken to know the antibiotic susceptibility pattern of *Pseudomonas aeruginosa* from our hospital. The current study was undertaken in the department of microbiology, Shri B M Patil medical college, Viayapur, from January 2015 to July 2015.Samples which showed the growth of P.A were included in the study. Samples which did not show the Growth of *Pseudomonas aeruginosa* were not included in the study. A total of 60 *Pseudomonas aeruginosa* were isolated during the study period. Majority of the isolates (50%) were from pus sample. Majority of the isolates (75%) were from male patients. Majority of the isolates (75%) were from male patients. In our study resistance was least against Piperacillin + Tazobactum (12%), followed by amikacin (22%), imipenem (25%), gentamicin (33%). Resistance rate was highest among ofloxacin (75%), Carbenicillin (63%), Cefaperazone+Sulbactum (62%). To conclude *Pseudomonas aeruginosa* is emerging as one of the most common drug resistant organism therefore care should be taken while prescribing antibiotic, so that misuse or overuse is prevented and the treatment should be started only after the sensitivity of the isolates is carried out.

Introduction

Antimicrobial agents have been the only easily and widely used therapeutic option available to counter the infections caused by diverse microbial agents. However, microbial populations have developed various strategies to overcome these antimicrobial agents - a major contributing factor in the development of anti-microbial resistance world-wide.[1] The microbial pathogens, as well as, their antibiotic sensitivity pattern, may change from time to time and place to place. Therefore knowledge of current drug resistance pattern of the common pathogenic bacteria in a particular region is useful in clinical practice.[2]

Pseudomonas aeruginosa is a gram-negative bacterium that continues to be a major cause of opportunistic nosocomial infections, causing around 9–10% of hospital infections.

Despite advance in medical and surgical care and introduction of wide variety of antimicrobial agents against anti-pseudomonal activities, life threatening infection caused by *Pseudomonas aeruginosa* continue to cause complications in hospital acquired infections. A major reason for its prominence as a pathogen is its high intrinsic resistance to antibiotics, such that even for the most recent antibiotics, a modest change in susceptibility can thwart their effectiveness.

The rapid increase of drug resistance in clinical isolates of this opportunistic human pathogen is of worldwide concern. Unfortunately, *Pseudomonas aeruginosa* demonstrates resistance to multiple antibiotics, thereby jeopardizing the selection of appropriate treatment.[3] The current study was undertaken to know the antibiotic susceptibility pattern of *Pseudomonas aeruginosa* from our hospital.

Materials and Methods

The current study was undertaken in the department of microbiology, Shri B M Patil medical college, Viayapur, from January 2015 to July 2015.Samples which showed the growth of *Pseudomonas aeruginosa* were included in the study. Samples hich did not show the Growth of *Pseudomonas aeruginosa* were not included in the study.

The specimens were inoculated on blood agar and MacConkey agar and were kept in the incubator at 37^{o}C for 24-48. The isolates were identified by conventional techniques and with appropriate biochemical reactions. *Pseudomonas aeruginosa* was identified by Gram stain morphology, typical colony appearance, characteristic sweet grape like odour, blue-green appearance [pyocyanin pigment], motility and positive oxidase reaction.[4]

Antimicrobial susceptibility testing was done by Kirby-Bauer disk diffusion method and results are interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines [5] Following antibiotics were used, ciprofloxacin, imipenem, ceftazidime+Clavulanic acid, gentamycin, ceftriaxone, Norfloxacin, Carbenicillin, ofloxacin, Netilmicin, Cefaperazone+ Sulbactum amikacin.

Results and Discussion

Pseudomonas aeruginosa is a Gram negative, non sporeforming, straight or slightly curved rod-shaped bacterium that occurs as a single bacterium or in pairs and occasionally in short chains. It is widely distributed in nature including soil, water and various types of vegetation throughout the world. Besides that it has also revealed its presence in disinfectants, respiratory equipment, sinks, taps, and mops within the hospital as a biofilm.[6] A total of 60 *Pseudomonas aeruginosa* were isolated during the study period. Majority of the isolates(50%) were from pus sample. sample wise distribution if the isolates are shown in Table 1.

Pseudomonas aeruginosa is primarily a nosocomial pathogen. It is the most common cause of infections of burn sepsis and of UTIs and the otitis externa. *Pseudomonas aeruginosa* is usually prevalent among patients with cystic fibrosis, organ transplants and acute leukemia. Infections with the pathogen have high mortality rates.[6] Table 1 shows sample wise distribution of the isolates. Majority of the isolates (50%) were from pus samples. Our results are in agreement with study carried by Shenoy *et al.,* [7] and Chudhary *et al.,* [8] who also reported that pus was the major sources for the *Pseudomonas aeruginosa.* Table 2 shows sex wise distribution of the isolates. Majority of the isolates (75%) were from male patients.

Our study is in agreement with Ekrem *et al.,* [6] who also revealed that isolates were more from male patients. Table 3 shows age wise distribution of the isolates. More number of isolates were from 21-40 and 41-60 age groups which is in agreement with study conducted by Kirecci *et al.,* [6]

Pseudomonas aeruginosa has been emerged as an important opportunistic pathogen. Being an extremely adaptable organism it can survive and multiply even with minimal nutrients and is one of the leading causes of hospital acquired infections. Several studies were carried out to detect antibiotic sensitivity pattern for the various drugs available. Such studies help clinicians for giving cost effective treatment to the patients.[9] The bacteria can develop resistance to antibacterials both through the resistance genes on extrachromosomal genetic elements and through mutational processes. Increasing resistance to different antibiotics especially among nosocomial strains, has been reported world-wide and this is a important therapeutic problem in the treatment of disease due to the pathogens.[6]

In our study resistance was least against Piperacillin+Tazobactum(12%), followed by amikacin(22%), imipenem(25%), gentamicin (33%) as shown in Table 4 which is comparable to study carried by Ramana *et al.,* [3]who reported 14% resistance to Piperacillin+Tazobactum Similarly Singh *et al.,* [10] reported 25% and 35% resistance to amikacin and gentamicin respectively ,which is comparable to our study. Our study revealed that resistance rate was highest among ofloxacin (75%), Carbenicillin (63%), Cefaperazone+Sulbactum (62%), similar findings were reported by Hancock *et al.,* .[11]

Table.1 Sample wise distribution if the isolates

Sample	Number	%
Pus	30	50
Ear discharge	20	33
Urine	6	10
Blood	4	7
Total	60	1000

Table.2 Sex wise distribution of the isolates

Sex	Number	%
Male	45	75
Female	15	25

Table.3 Age wise distribution of the isolates

AGE	NUMBER	%
0-20	14	23
21-40	17	28
41-60	15	25
61-80	14	23

Table.4 Resistance pattern of isolates

Antibiotics	Percentage
Gentamicin	33.3
Ciprofloxacin	46.7
Norfloxacin	53.2
Carbenicillin	62.7
Amoxyclav	87.5
Amikacin	22.2
Piperacillin+Tazobactum	12.6
Cefaperazone+Sulbactum	60.8
Ofloxacin	76
Netilmicin	47.6
Imipenem	25
Ceftazidime+Clavulanic acid	62.2

To conclude *Pseudomonas aeruginosa* is emerging as one of the most common drug resistant organism therefore care should be taken while prescribing antibiotic, so that misuse or overuse is prevented and the treatment should be started only after the sensitivity of the isolates is carried out.

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