Original Research Article

Antibiotic susceptibility pattern of *Pseudomonas aeruginosa* at the tertiary care center, Dhiraj Hospital, Piparia, Gujarat

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Abstract

Background: Infections with pseudomonas have been an important cause of Morbidity and Mortality throughout the history, which makes the treatment challenging every year. The present study was intended to find out the drug resistance pattern of *Pseudomonas aeruginosa* from various clinical specimens.

Materials and methods: The study was conducted during April 2015 to September 2015. One hundred and one strains of *Pseudomonas aeruginosa* were subjected to antimicrobial susceptibility test by modified Kirby-Bauer disk diffusion method as per CLSI guidelines with *Pseudomonas aeruginosa ATCC* 27853 as control strain.

Results: One hundred and one Strains were isolated from 83 males and 28 females. Majority of the *Pseudomonas* strains were isolated from ICU (30.63%), followed by Orthopedics (14.41%) and Pediatrics wards (13.51%), Strains were mainly isolated from pus samples (48.65%) followed by urine (20.72%) and sputum sample (13.51%). Majority of the strains were resistant to Aztreonam (70.27%) followed by Ciprofloxacin (54.95%), Amikacin (53.15%), Piperacillin (51.35%), Cefoperazone-sulbactam (50.45%), Gentamycin (49.55%), Cefepime and ceftazidime at 45.95%

respectively. While with Piperacillin - Tazobactam we got sensitivity of 63.97% and with Imipenem and Imipenem –EDTA we got sensitivity of 78.38% and 81.08% respectively.

Conclusion: We concluded that drug resistance of Pseudomonas was mainly isolated from pus samples of ICU patients, which is therefore an urgent call for the physicians to limit the indiscriminate use of antibiotics. The encouraging finding was its sensitivity to Imipenem and Piperacilin-Tazobactum as an effective antibiotic for the treatment.

Key words

Antibiotic resistance, Carbapenem sensitivity, *Pseudomonas aeruginosa*.

Introduction

Pseudomonas aeruginosa *(Ps. aeruginosa)* is one of the important bacterial pathogens isolated from various samples. Despite advances in medical and surgical care and introduction of wide variety of antimicrobial agents against having anti-pseudomonal activities, life threatening infection caused by *Ps. aeruginosa* continues to cause complications in hospital acquired infections. *Ps. aeruginosa* is increasingly recognized as an emerging opportunistic pathogen of clinical relevance that causes infections in hospitalized patient particularly in burn patients, orthopedic related infections, respiratory diseases, immunosuppressed and catheterized patients [1, 2].

Infections caused by *P. aeruginosa* are frequently life-threatening and difficult to treat as it exhibits intrinsically high resistance to many antimicrobials and the development of increased particularly multi-drug resistance in health care settings. Mechanisms that cause antimicrobial drug resistance and multi-drug resistance in *P. aeruginosa* are due to acquisition of resistance genes (e.g. those encoding beta-lactamase and aminoglycoside modifying enzymes). The microbial pathogens, as well as, their antibiotic sensitivity pattern, may change from time to time and place to place. The knowledge of current drug resistance pattern of the common pathogenic bacteria in a particular region is useful in clinical practice [3]. Therefore the present study was designed to know the current antimicrobial susceptibility pattern of *pseudomonas aeruginosa* from various clinical specimens.

Materials and methods

The study was conducted at the Tertiary care center, Dhiraj Hospital for a period of 6 months from April 2015 to September 2015.

Specimens: One hundred and eleven specimens (83 males and 28 females) were collected from various sources like pus/wound, sputum, urine, catheter tip, body fluids, and ET secretions and were inoculated on routine culture media like Nutrient agar, MacConkey's agar and blood agar. A battery of tests were performed that included Gram's staining, colony morphology, motility tests, sugar fermentation tests and biochemical tests such as oxidase test, urease and Phenyl puruvic acid test and IMViC (indole, methyl red, Voges-Proskauer and citrate) tests for the identification of *pseudomonas* species.

Susceptibility test: *Pseudomonas aeruginosa* strains were subjected to antimicrobial susceptibility test by modified Kirby-Bauer disk diffusion method as per CLSI guidelines. a panel of anti-pseudomonal antimicrobials of standard strengths as follows: Gentamicin 10mcg, Amikacin 30 mcg, Colistin 30 mcg, Piperacillin-tazobactum 100/10 mcg, Ceftriaxone 30 mcg, Cefoperazone-sulbactum 75-30 mcg, cefipime 30mcg, ceftazidime 30mcg, Ciprofloxacin 5 mcg, Aztreonam 30 mcg, Imipenem 10 mcg, Imipenem/EDTA 10/750mcg, Polymyxin 300 units/disc (Hi Media Laboratories Pvt. Ltd., Mumbai, India). *Pseudomonas aeruginosa ATCC* 27853 was used as control strain.

Results

Majority of the *Pseudomonas* strains were isolated from ICU (30.63%), followed by Orthopedics (14.41%) and Pediatrics wards (13.51%) as per **Table - 1**. Prevalence of Pseudomonas in different age group was as per **Graph – 1**.

Table - 1: Distribution of 111 *pseudomonas* isolates in different Wards.

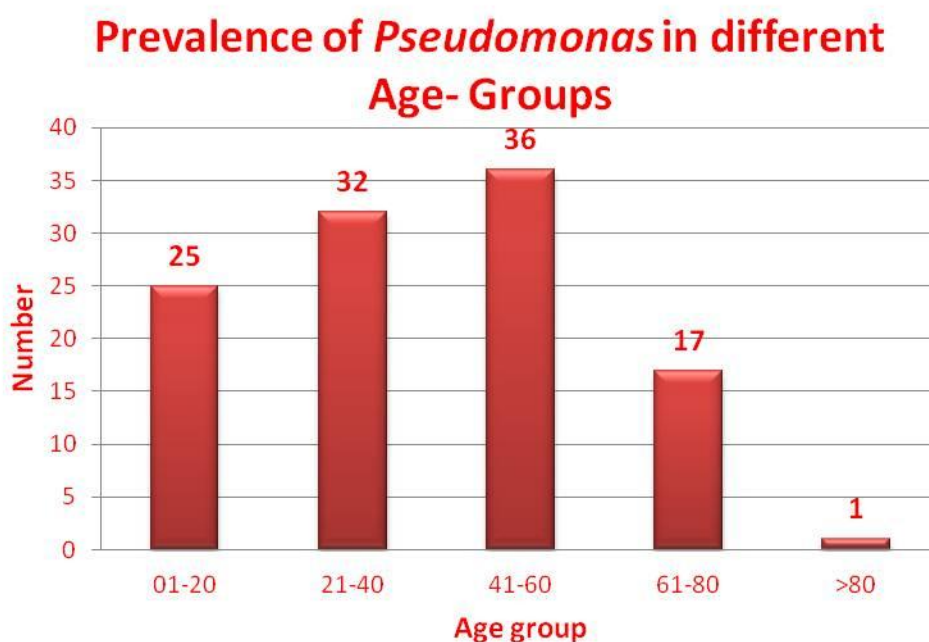| Ward	No. of isolate	%
ICU	34	30.63
Orthopedics	16	14.41
Pediatrics	15	13.51
Surgery	12	10.81
Recovery	07	6.31
Respiratory Medicine	06	5.41
Medicine	05	4.50
Casualty	05	4.50
Special Room	03	2.70
Obstetrics	03	2.70
Urology	03	2.70
Oral Surgery	02	1.80

Strains were mainly isolated from pus samples (48.65%) followed by urine (20.72%) and sputum sample (13.51%) as per **Graph – 2.**

Majority of the strains were resistant to Aztreonam (70.27%) followed by Ciprofloxacin (54.95%), Amikacin (53.15%), Piperacillin (51.35%), Cefoperazone-sulbactam (50.45%), Gentamicin (49.55%), Cefepime and ceftazidime at 45.95% respectively. While with Piperacillin - Tazobactam we got sensitivity of 63.97% and with Imipenem and Imipenem –EDTA we got sensitivity of 78.38% and 81.08% respectively as per **Graph – 3.**

Discussion

Pseudomonas aeruginosa emerged as an important pathogen and responsible for nosocomial infection that is important cause for mortality and morbidity among hospital infections. Resistant profiles of *P. aeruginosa* to the various antibiotics tested varied among the isolates investigated. One striking feature of this study is that maximum isolated is found to be sensitive to Imipenem [4, 5].
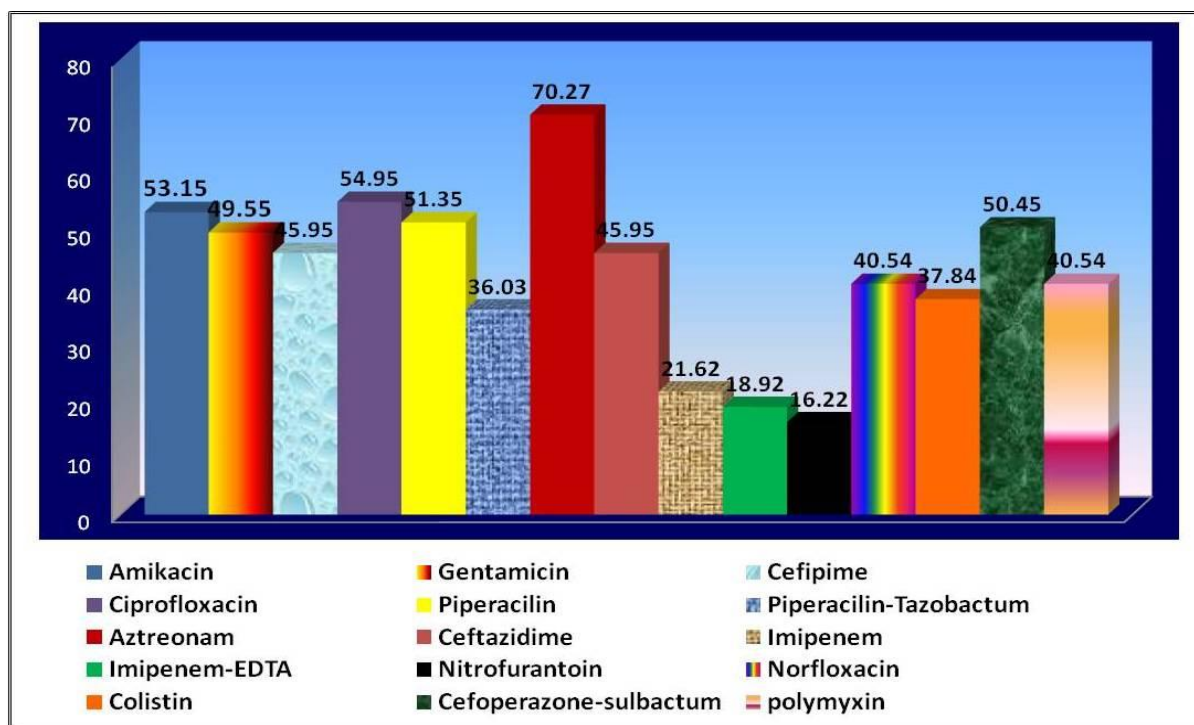
Graph - 1: Antibiotic resistance pattern of various drugs.

Lakum S, Anita, Pandya H, Shah K, Lakhani SJ. Antibiotic susceptibility pattern of *Pseudomonas aeruginosa* at the tertiary care center, Dhiraj Hospital, Piparia, Gujarat. IAIM, 2016; 3(5): 133-137.

Graph – 2: Isolation of Pseudomonas species from various clinical specimens.
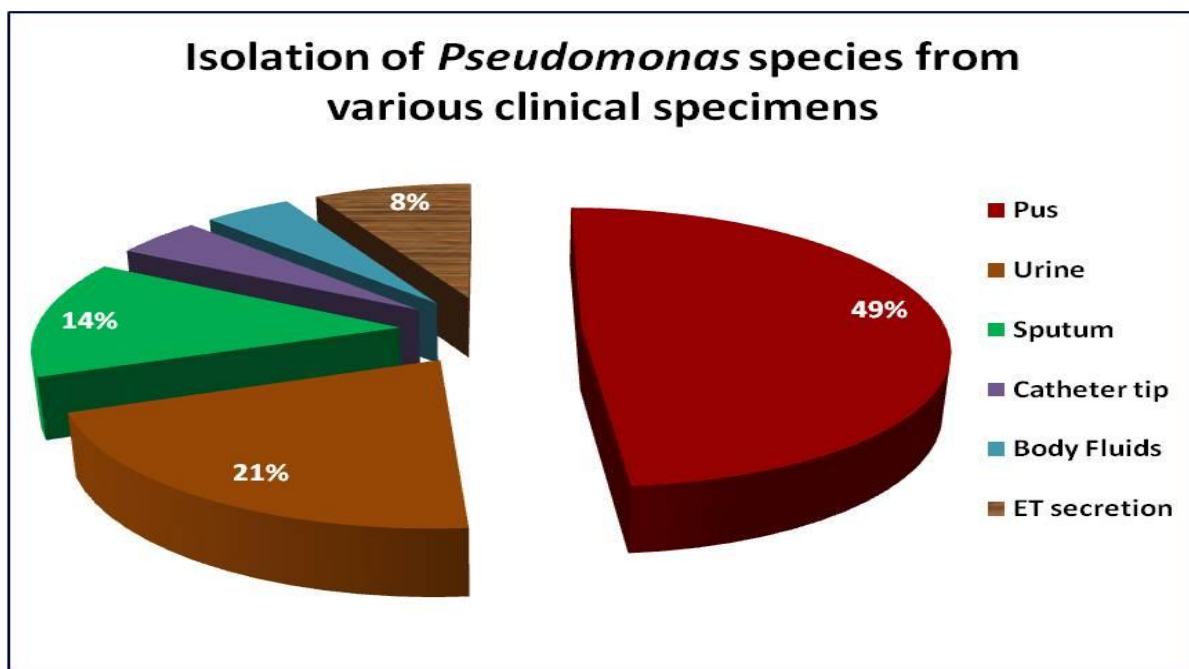
Graph – 3: Drug resistance pattern.

Conclusion

Drug resistant Pseudomonas was mainly isolated from pus samples of ICU patients. The encouraging finding was sensitivity of pseudomonas to Imipenem and Piperacilin-Tazobactum as an effective antibiotic for the treatment. More restricted and rational use of these drugs, to the concept of "Reserve drugs" to minimize the misuse of available antimicrobials is needed. In addition, regular antimicrobial surveillance is essential for monitoring of the resistance patterns.

Acknowledgement

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