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CURRENT SENERIO OF ANTIMICROBIAL RESISTANCE PATTERNS OF PSEUDOMONAS AERUGINOSA CLINICAL ISOLATES IN EAST UTTAR PRADESH, INDIA

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ABSTRACT

Background: Pseudomonas aeruginosa is an important pathogen isolated among non- fermenter gram negative bacilli from various clinical specimens. Increasing resistance had documented among P. aeruginosa stains to commonly used antimicrobial agents. This study aimed to investigate the anitimicrobial resistance patterns of Pseudomonas aeruginosa from various clinical samples. **Methods:** From June 2018 to December 2018 a total 39 strains of Pseudomonas aeruginosa were isolated from various clinical specimens and characterized by standard bacteriological procedures. Antimicrobial susceptibility patterns of each isolates were carried out by the Kieby-Bauer disk diffusion method as per CLSI guidelines. **Result:** The maximum Pseudomonas aeruginosa ware susceptibility to Meropenum and levofloxacin (66.67%) while maximum resistance was found to cephalosporins (100%). **Conclusion:** The results of this study confirmed the occurrence of drugs resistance strains of Pseudomonas aeruginosa. So there is a continuous need of conduction of surveillance programmers to formulate rational treatment strategies to combat this emerging challenge.

KEYWORDS: Pseudomonas Aeruginosa, Resistance, Antibiotic susceptibility.

INTRODUCTION

The genus Pseudomonas aeruginosa comprises of more than 140 species, Pseudomonas aeruginosa is one of the common bacterial pathogen isolated from various clinical samples. The others are essentially saprophytic and occur widely in nature. It range causes a wide range of infections including bacteraemia, pneumonia, meningitis, urinary tract and wound infections.[1-2]

Infections due to Pseudomonas aeruginosa are also seen in healthy individuals but 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.[3]

Antimicrobial agents have been the only easily and widely used therapeutic option available to counter the infections caused by various microbial agents. The development of resistance to all available antibiotics in some organisms may preclude the effectiveness of any antibiotic regimen.[4-5]

Pseudomonas aeruginosa exhibits intrinsically high resistance too many antimicrobials and the development of increased multidrug resistance in health care setup is a difficulty to treat infection caused by Pseudomonas aeruginosa.[6-7]

Because of the facts, studies on current antimicrobial resistance pattern of Pseudomonas are essential to find out the susceptibly of this pathogen against commonly prescribed antibiotics in any health care facility. This will help to the clinician to optimize the current senerio of treatment.

MATERIAL AND METHODS

This study was conducted at Government Medical College. Total 100 clinical samples like Ear pus/ Pus, urine, Endo- tracheal tube, Sputum and Foley's tip were collected from patients admitted in wards.

Inclusion Criteria for patients

Patients admitted to different departments of the hospital included in this study.

Exclusion Criteria for Patients

Patients coming as outpatient to emergency were not included

Sample processing

The collected samples were subjected to direct Gram stain and all specimens were inoculated onto nutrient

agar, 5% sheep blood agar and MacConkey's agar medium. Urine samples were inoculated onto Cystine Lactose Electrolyte Deficient agar (CLED).

All the catalase positive, oxidase positive, non-lactose fermenting colonies on Mac Conkey agar were provisionally identified by colony morphology and pigment production. They were inoculated in Triple sugar iron (TSI) agar slope. The colonies which failed to acidify the TSI agar were considered as non-fermenters and subjected to Hugh – leifson oxidation – fermentation and Decarboxylation of Lysine, Arginine and Ornithine test.Cetramide agar medium has been used as it is selective for pseudomonas.

Antibiotic susceptibility Testing: AST were done by Kirby Bauer Method using various antibiotic discs (HIMEDIA) including Meropenem (MRP), Imipenem (IPM), Amikacin (AK), Gemtamicin (GEN), Ciprofloxacin (CIP), Levofloxacin (LE), Ppiperacillin-tazobactam (PIT), Cefotaxime (CTX), Cefepime (CPM).

RESULT

In present study 39 strains of Pseudomonas aeruginosa were isolated and identified by standard microbiological procedures, out of total of 100 clinical specimens investigated. The rate of isolation of P. aeruginosawas 39% of theses 39 strains of P. aeruginosa, 21 (53.8%) were from females and 18 (46.15%) were from males. Most of them belonged to the age group 21-40 years (19, 48.7%) followed by patient of 41-60 years of age (13, 33.34%) as shows in table 1. Ear pus/ pus, urine, Endo-tracheal tube (93, 93%) were the predominant sources of specimens of Pseudomonas aeruginosa clinical isolates as depicted in table 2.

Table. 1: Age and gender wise distribution of clinical isolates of Pseudomonas aeruginosa.

Age (Years)	Male (No.)	Female (No.)	Total No. (%)
<20	01	03	04 (10.25%)
21-40	10	09	19 (41.02%)
41-60	08	05	13 (33.34%)
>60	02	01	03 (7.69%)
Total	2 (53.81%)	18 (46.15%)	39 (100%)

Table. 2: Distribution of specimens of Pseudomonas aeruginosa clinical isolates.

Type of samples	Total No. of Samples (n=100)	Total no of Isolates (n=39)
Ear Pus/ Pus	40	20
Urine	36	12
Endo-Tracheal tube	17	05
Sputum	05	01
Foley's tip	02	01
Total	100	39

Antimicrobial susceptibility patterns of Pseudomonas varied markedly with the antibiotics tested. P. aeruginisa showed maximum resistance to cephalosporins (100%), Minimum resistances to Meropenum and Levofloxacin 33.34% for both. The sensitivity pattern of the P. aeruginosa to various antibiotics tested was in order to Meropenum and Levofloxacin (66.67%) >Imipenum (58.97%) >Piperacillin- tazobactam (56.41%) >Amikacin and Gentamycin (51.28%) > Ciprofloxacin (41%) as shown in Table 3.

Table. 3: Antimicrobial susceptibility patterns of Pseudomonas aeruginosa clinical isolates.

Antibiotics	Sensitivity no. (%)	Resistance no. (%)
Carbepenems		
Meropenum	26 (66.67%)	13 (33.34%)
Imipenum	23 (58.97%)	16 (41.0%)
Aminoglycosides		
Amikacin	20 (51.28%)	19 (48.71%)
Gentamycin	20 (51.28%)	19 (48.71%)
Fluroquinolones		
Levofloxacin	26 (66.67%)	13 (33.34%)
Ciprofloxacin	16 (41.0%)	23 (58.97%)
Ureidopenicillin		
Piperacillin-tazobactam	22 (56.41%)	17 (43.58%)
Cephalosporins		
Cefotaxime	0 (0%)	39 (100%)
Cefepime	0 (0%)	39 (100%)

DISCUSSION

Increasing of resistance by Pseudomonas aeuroginosa has now become a major threat in medical world.

In this study, we assessed the increasing incidence of resistance in patients of various departments in a tertiary care hospital. In our study the most number of P. aeruginosa isolated was from pus sample n=20 followed by urine n=12, endo-tracheal tube n=05, sputum n=01 and Folye's tip n=01. The isolation rate from different clinical samples varies according to the condition and the specimen. These results are in line with previous studies.[8,9,10,11] The isolation rate from different clinical isolates varies according to the condition and specimen.

A high rate of P. aeruginosa has been isolated from the age group 12-40 years in present study. These finding supported by previous study [10]. This may be due to maximum occupational exposure to the organism.

In present study we found the more prevalence in male (53.81%) than female (46.15%). A previous study from Nigeria and other from Bareilly (Uttar Pradesh) also reported high prevalence rate in male than female [1, 12].

Increasing resistance to different anti- pseudomonal drugs particularly among hospital strains has been reported worldwide [13, 14] and this is serious therapeutic problem in the management of disease due to these organisms. The resistance profile of P. aeruginosa to the ten anti- microbial agents tested varied among the isolated investigated. One striking feature in present study was that maximum P. aeruginosa isolates were found to be sensitive to meropenum (MRP) and levofloxacin (Le). This may be due to the limited use to these antibiotics at this hospital.

Imipenum resistance rate was 41% in present study. Other study from various place support our findings of resistance to Imipenum in recent years [10, 11, 15, 16]. Aminoglycosides resistance rate found to be 48.71% in present study. A high resistance rate to aminoglycosides has been reportes in studies done in India [10, 11], Bangladesh [17], Turkey [18] and from Malaysia [19].

Ciprofloxacin and Levofloxacin shows resistance rate 58.97% and 33.34% respectively. A 3 year study from India also reported ciprofloxacin resistance of 63.1% [12] Two other study from India [20, 21] and Bangladesh [22] also reported similar resistance to ciprofloxacin.

The ureidopenicillin group represented by Piperacillin-tazobactam showed a relatively lower resistance of 43.58%. A study from Bareilly [14] and from India [20] reported resistance to piperacillin-tazobactam was 32.33% and 45.6% respectively.

The resistance rate of 3rd generation cephalosporins shows 100% resistance to P.aeruginosa in present study. Remarkable resistance to 3rd generation cephalosporins were also recorded (>90%) by Bhale Rao et al and (96-100%) by Awari et al in India [23, 24]. This indicate the increasing resistance of drugs in current senerio which can be due to blind therapy, due to acquire resistance of P. aeruginosa, low permeablity and production of inducible cephalosporins, lack of awereness for antibiotics.

CONCLUSION

Findings of antibiotic sensitivity testing clearly demonstrate the occurrence of resistance to various anti microbial agents among the Pseudomonas aeruginosa isolates. Meropenum and Levofloxacin were two most sensitive drugs against P. aeruginosa. We suggest for judicious strategy on the restricted use of these drugs for treatment. Treatment should be on the basis of anti-microbial susceptibility testing is essential.

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