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Antibiotic Resistance Pattern of *Pseudomonas aeruginosa* Strains Isolated from Blood Cultures-Batec/Alert3D in a Tertiary Care Centre Narayana Hospital and Medical College Nellore AP, India

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A B S T R A C T

Determination of the susceptibility profile of *Pseudomonas aeruginosa* strains by detecting their anti - microbial resistance patterns is necessary with regards to a current empirical treatment in bloodstream infections. The aim of this study was to detect the antimicrobial susceptibility pattern of *P.aeruginosa* strains isolated from blood cultures between august 2015 to august2016 at the Narayana Hospital and Medical College Nellore AP .Blood cultures were processed by automatized BACT/Alert 3Dsystem.P.aeroginosa strains were identified by conventional methods Antimicrobial susceptibility tests were performed by Kirby-Bauer disc diffusion method in accordance with the recommendations of Clinical and Laboratory Standards Institute (CLSI).One twenty six P .aeruginosa strains were isolated during the study period .comprises 96male(76.19%) and 30 female (23.81%)between the age group less than 10 to more than 60year. Antimicrobial resistance pattern of the *P. aeruginosa* strains isolated from blood cultures were found . High resistance- Amoxicillin 102(80.95%) Ticarcilline plus clavulanic acid 94(74.60%), Cefepime 78(61.90%) cefexime 76(60.32%) dorepenenum 70 (55.56%) polymixin –B 68(53.9%). High sensitivity with ciprofloxacin 108(85.7%) pipercillin and tazobactum102 (80.95%) oflaxacillin 96 (76.19%), imepenem 94 (74.60%), tigycyclin 88 (69.84%) co-trimaxazole 88 (69.84%).

Introduction

Antibiotics when first introduced were considered as a magic bullet. A single injection of penicillin could eradicate life threatening infections. Unfortunately, with time due to malpractices of natural causes. most of the cheaper antibiotics have lost their efficacy and more and more expensive complicated antibiotics were introduced and marketed to combat simple infection (ref 2). Microbial pathogens, as well as, their antimicrobial susceptibility pattern may change from time to time and place to place. Therefore knowledge of current antimicrobial resistance pattern of pseudomonas in particular region is useful in clinical practice Pseudomonas aeruginosa

is a gram-negative bacteria responsible for a wide range of clinical conditions. It is resistant to many commonly use antimicrobials (Anti pseudomonas activity). Life threatening infections caused by *P.aeruginosa* continue to cause hospital acquired infections.

P.aeruginosa recognized as opportunistic pathogen particularly immunocompromised predisposing conditions including malignancies (Martino *et al.*,) Jugo *et al.*, 2002; Charif *et al.*, 2003; diabetes burns, HIV/AIDS, ICUS (Edgeworth *et al.*, 1990). But *Pseudomonas aeruginosa* bacterimia has mortality of 30% ref 1 (Osman *et al.*, 2004) Epidemiological study indicate resistance is increasing in clinical isolates (ref3). Nowadays more and more resistance of pseudomonas are encounter in clinical practice a serious problem increasing mortality and morbidity and also cost of treatment. It is the one of the important gram-negative bacteraemia and there is an increase f 30 to 60% of bacteraemia in recent years& increasing mortality and morbidity with *Pseudomonas* bacteraemia. So it is need to conduct studies on pseudomonas drug sensitivity pattern that would help clinician to choose correct antibiotic for treatment to reduce morbidity and mortality

Materials and Methods

This study was conducted in central laboratory microbiology Narayana Hospital and Medical College Nellore AP a tertiary care centre ,referral and teaching hospital (UG250 students per year) having bed strength of more than 1200,with broad specialties and super specialties- cardiology, cardio-thoracic surgery, nephrology, urology; neurosurgery, surgical gastro-enterology and endocrinology.

Sample processing

Sample collected from patient in blood culture bottle the blood culture bottles were processed in BACt/Alet 3D System. Growth seen in 8-12 hours are subcultured on routine MaC Conkey. Nutriant media and blood agar plates. pigment producing and non lactose, oxidase positive strain are identified as *Pseudomonas* accounts for 126 positives. These are further processed for biochemical properties TSI, Citrate, urease peptone water incubating at 37c. TSI-Alkaline slant/no change on but, Indole negative, urease negative and positive citrate and glucose utilized oxidative form acid and are conformed *Pseudomonas aeruginosa.*

Antimicrobial susceptibility test

Application of antibiotic discs to the inoculated agar plates- Antimicrobial susceptibility of all the isolates was performed by disc diffusion method (modified Kirby-Bauer disc diffusion method) accordingly Clinical Laboratory Standards Institute (CLSI) guide lines.

The anti biotics tested are Amoxicillin (30mg) cefexime (30) ceftazidine (30mg) cefipime (30mg) cotrimoxazole (30mg) ciproflaxacillin (10mg) oflaxacillin (10mg) amikacin (30mg) tygicycline (75mg) plymixin-B, ceftazidene and csalbactem (30mg) tecarcillin and clavalanic acid (75mg) Piperacillin and tazobactum (100/10mg) imepenem (10mg) dorepenem (0mg).

Results and Discussion

The study comprises of of 126 pseudomonas aeruginosa strains isolated from blood samples from august 2015 to 2016 .In total of 126 isolates 96(76.19%) are male and 30(23.81%) are female as sex wise distribution as shown in table.1.

Age wise distribution of the isolates shown in table no 2 High incidences are seen in the age group 20 to 29 and 30 to 39 22 (17.46%), 22 (17.46%) followed by above sixty years age 20 (15.%) 40 to 49 age group 12 (9.25 %), 50 to 59 age group 10 (7.94%)1 0 to 19 age 8 (6.35%) in case of male and in case of female 50to 59 age group 10(7.94%), followed by6(4.76%)-,20 to 29 age group 6(4.76%)-age group 40to 49 and 2o to 29 4(3.17%) in case f female

Highest sensitivity to ciprofloxacillin 108 (85.71%) follows piperacillin plus tazobactum 102 (80.95%), oflaxacillin 96 (76.19%) imepenem 94(74.60%),co-trimaxazole 88 (69.84%) tygicyclin 88 (69.84%) ceftazidine 74 (58.13%), amikacin 72(57.14%)

Highest resistance with amoxicillin 102 (80.95%) followed by tycarcillin and clavanicacid 84 (74.60%) cefepime 78 (61.90%), cefexime 76(60.32%)polymixin-B68 (53.97%) as shown in table 3

P.aeruginosa emergencing an important pathogen and responsible for nosocomial infections it is the one of the important cause of mortality and morbidity among hospital patients. The pre eminent of pseudomonas aeruginosa in hospital infections is due to its resistance to common antibiotics and antiseptics and its ability to establish itself widely in hospitals.

Being a high adoptable organism survive and multiply even with minor nutrients if moisture is available

As pseudomonas aeruginosa causes serious infections and is one of the leading cause of hospital acquired infections Several studies were carried out to detect antibiotic sensitivity pattern for various drugs. Such studies help to clinician for better management and appropriate antibiotic treatment is associated with better prognosis (Leibouici *et al.,* 1997) rapid diagnosis has clinical impact (Doen *et al.,* 1994).

So the present study was condocted to determine the antibiotic sensitivity pattern of *P.aeruginosa* isolated from blood samples

In this study sex wise prevalence of clinical isolates shows that infections caused by *P.aeruginosa* are more common in males 76.19% compared to females. This is comparable with study of Javia *et al.,* ref5, Jamshaid Ali Khan *et al.,* (ref 5),and Rashid *et al.,* (ref 7).

In the present study age wise prevalence shows that most patients were 20 to 29 and 30 to 39 which is more or less comparable with study of Rashid *et al.,* (ref 6).

The unique feature of *P.aeruginosa* isolates is the resistance to variety of antibiotics, primarily attributed to low permeability of cell wall production of usable cephalosporin age active efflux and poor effinity for the target (DNA gyrage) REF(22) Lim KT, Yasmin Yeo *et al.*

In this study quinolines family exhibits higest susceptible pattern ciproflaxacin 85.71% followed by oflaxacillin 76.19% combination of piperacilln with tazobactun also have high sensitivity 80.95 %(.Raja and singh showed 90.6% with pipercillin and tazobactum, 2007, imepenium 74.60% comparitively low similar studies like AL Jasser and ELPlhizzi (2004) (ref20) showed 91.6%

Penicillins are narrow spectrum antibiotics therefore high resistance pattern observed in this study.

Table.1 Sex Wise Distribution

MALE	96	76.19%
FEMALE	30	23.81%
TOTAL	126	100.00%

Table.2 Age wise distribution of isolates

AGE	MALE		FEMALE		TOTAL	
<10	2	1.59%	2	1.59%	4	3.17%
10 TO 19	8	6.35%	0	0.00%	8	6.35%
20 TO 29	22	17.46%	6	4.76%	28	22.22%
30 TO 39	22	17.46%	4	3.17%	26	20.63%
40 TO 49	12	9.52%	6	4.76%	18	14.29%
50 TO 59	10	7.94%	10	7.94%	20	15.87%
ABOVE 60	20	15.87%	2	1.59%	22	17.46%

Table.3 Antibiotics susceptibility pattern of isolates

ANTIBIOTICS	RESISTANCE	(%)	SENSITIVITY	(%)	TOTAL
AMOXYCILLIN	102	80.95%	24	19.05%	126
CEFIXIME	76	60.32%	50	39.68%	126
CEFTAZIDIME	52	41.27%	74	58.73%	126
CEFIPIME	78	61.90%	48	38.10%	126
CO-TRIMOXAZOLE	38	30.16%	88	69.84%	126
CIPROFLOXACIN	18	14.29%	108	85.71%	126
OFLOXACIN	30	23.81%	96	76.19%	126
AMIKACIN	54	42.86%	72	57.14%	126
TEGICYCLINE	38	30.16%	88	69.84%	126
POLYMYXIN-B	68	53.97%	58	46.03%	126
CEFOPERRAZONE +SULBACTAM	54	42.86%	72	57.14%	126
TICARCILINA+CLAVULANIC ACID	94	74.60%	32	25.40%	126
PIPERACILLIN+TAZOBACTAM	24	19.05%	102	80.95%	126
IMIPENEM	32	25.40%	94	74.60%	126
DOREPENEM	70	55.56%	56	44.44%	126

High resisrance seen t amoxicillin 80.95 % similar pattern has been reported in studies in Nigeria (ref14) FAmadi ES Uzoaru PN rji I, Nwaziri AA, Malasia (ref15) Jmbo GTA JohnohP Ayeni J A, cephalosprines cefexime 60.32% cefepime 61.90% ceftriaxone.

Most distarbing pattern observed in this study was the the multidrug resistance exhibited by most of the islates. Although, similar pattern had been reported in studied conducted in Zaira ref Olayinka, Onile BA, and in Jamica (ref18) BrownPD, IzundiA. In conclusion the multi drug

resistance by *P.aeruginosa* isolated strains from blood culture pose direct clinical cosequences interms of patient management and controlling infection in order to prevent mortality

In conclusion, *P.aeruginosa* is the one of the causative agent of gram-negative bacterimias indiscreminate use of antimicrobials led emerging multidrug resistance. in this study ciproflaxillin, oflaxacilline and piperacilline and tazobactum are most effective drugs.

Regular monitoring of antimicrobial susceptibility pattern essential in blood stream infections to guide physician in prescribing proper drug and reducing multidrug resistance strains of *P.aeruginosa* and thereby mortality.

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