

RESISTANCE PATTERN OF PSEUDOMONAS AERUGINOSA ISOLATES FROM SURGICAL WOUNDS

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ABSTRACT:

Background: *Pseudomonas aeruginosa* is a major cause of nosocomial infections. Despite advances in sanitation facilities and the introduction of wide variety of antimicrobial agents with antipseudomonal activities, life threatening infections caused by this agent continue to cause devastations in the hospitals.

Aims & objective: To study the Resistance Pattern of *Pseudomonas Aeruginosa* Isolates From surgical wounds.

Material & Method: This study was a retrospective study done in Department of Microbiology, Index Medical College hospital and research center, Indore, m.p, india from March 2014 to december 2014. A total of 300 isolates of *Pseudomonas aeruginosa* both from indoor patients and patients attending outpatient department who were having surgical wound infections, were included in the study. Each isolate was evaluated for susceptibility to nine different antibiotics i.e cefotaxime, ceftriaxone, ceftazidime, cefdinir, amikacin, gentamicin, ciprofloxacin, piperacillin and imipenem. ESBL production was detected by double disc potentiation method by applying disc of cefoperazone [75µ] and combination of cefoperazone-sulbactam [75/30µ]. The results were interpreted according to Clinical Laboratory Standard Institute (CLSI) guidelines.

Result: Maximum resistance was seen to third generation cephalosporins-68.5 % to cefotaxime, 80.23% to ceftriaxone, 75.5% to ceftazidime, 93% to cefdinir. Amikacin showed resistance in 42.5% and Gentamicin in 81% of the isolates. Ciprofloxacin resistance was seen in 72.5% isolates while piperacillin resistance was seen in 43% of the isolates. Minimum resistance was seen to imipenem -2.5%

Conclusion: The present study highlights that the *Pseudomonas aeruginosa* remains an important cause of nosocomial wound infections. Is study thus gives the alarming signal for the future, making the therapeutic options more difficult. Strict infection control measures are to be followed to contain the so called water and soil organism as *Pseudomonas aeruginosa*.

INTRODUCTION

The development of wound infection depends on the integrity and protective function of the skin.[1] It has been shown that wound infection is universal and the bacterial type varies with geographical location, resident flora of the skin, clothing at the site of wound, time between wound and examination.[2] In recent years, there has been a growing prevalence of Gram negative organisms which have almost replaced *Staphylococcus aureus* in nosocomial infection. Of the Gram negative bacilli, *Pseudomonas aeruginosa* has been of particular interest, the incidence of which in wound infection has increased compared to a decade back study.[3] It has also been observed that 28% of healthy people in hospital environment are carrier for *P. aeruginosa*.[4]

The resistance in *Pseudomonas aeruginosa* is mainly mediated by Beta Lactamases [1]. Though the major ones are metallo beta lactamases but a number of studies indicate the presence of Extended Spectrum Beta Lactamases (ESBLs) in *Pseudomonas* as well [2],[3]. The prevalence and sensitivity of *P. aeruginosa* often varies between communities, hospitals in the same community and among different patient population in the same hospital. Faced with these variations, the physician in clinical practice has the responsibility of making clinical judgments and should have access to recent data on the prevalence and antimicrobial resistance pattern of commonly encountered pathogens. It is therefore important to institute a system for the surveillance of antimicrobial resistance that will involve the collection and collation of both clinical and microbiological data.

MATERIAL AND METHOD

This study was a retrospective study done in Department of Microbiology, Index Medical College hospital and research center, Indore, m.p, india from March 2014 to december 2014 . In this study, antimicrobial susceptibility testing of isolates was done by Kirby-Bauer disc diffusion method and ESBL production was detected by double disc potentiation technique. A total of 400 isolates of *Pseudomonas aeruginosa* both from indoor patients and patients attending outpatient department who were having surgical wound infections, were included in the study. The samples included were pus/ pus swabs/ aspirations from the wounds. The samples were inoculated on the blood agar and Mac-Conkey agar and passed in brain heart infusion broth, immediately and incubated for 18-24 hours at 37- C aerobically.

The organism was identified by its culture characteristics, gram staining and various biochemical reactions performed by standard bacteriological methods. Each isolate was evaluated for susceptibility to nine different antibiotics i.e cefotaxime, ceftriaxone, ceftazidime, cefdinir, amikacin, gentamicin, ciprofloxacin, piperacillin and imipenem. ESBL production was detected by double disc potentiation method by applying

disc of cefoperazone [75 μ] and combination of cefoperazone-sulbactam [75/30 μ]. The results were interpreted according to Clinical Laboratory Standard Institute (CLSI) guidelines[4]

RESULT AND DISCUSSION

Out of 300 isolates, 219(73 %) were from male patients and 81(27 %) were from female patients. Majority, 147(49.12%) of the strains were isolated from patients between 21-60 years of age. Most of them 267(89 %) were isolated from hospitalized patients and the rest 33(11 %) were from outdoor patients. Maximum resistance was seen to third generation cephalosporins-68.5 % to cefotaxime, 80.23% to ceftriaxone, 75.5% to ceftazidime, 93% to cefdinir. Amikacin showed resistance in 42.5% and Gentamicin in 81% of the isolates. Ciprofloxacin resistance was seen in 72.5% isolates while piperacillin resistance was seen in 43% of the isolates. Minimum resistance was seen to imipenem -2.5%. In *Pseudomonas aeruginosa*, ESBL production was observed to be 59 %. The susceptibility pattern of both *Pseudomonas aeruginosa* isolates - ESBL producers and ESBL non producers to various beta lactam antibiotics, is being shown in the [Table/Fig 1].

Table 1: Age wise distribution of participant

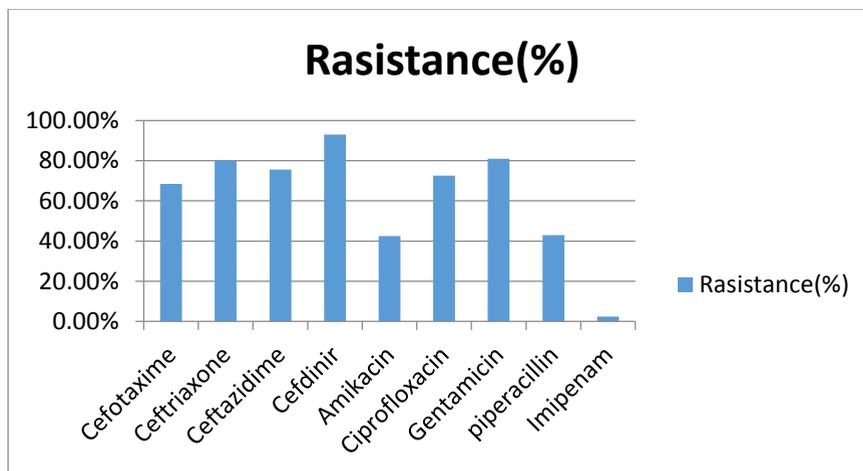
Age group(year)	Number(n)	Mean age(year)
20-60	300	45 \pm 2.5

Table 2: Distribution of participant according to location

Location	Number
Indoor(hospitalized)	267(89%)
OPD	33(11%)
Total	300(100%)

Table 3: Percentage of resistance towards various antibiotics

Drug name	Resistance (%)
Cefotaxime	68.5%
Ceftriaxone	80.23%
Ceftazidime	75.5%
Cefdinir	93%
Amikacin	42.5%
Ciprofloxacin	72.5%
Gentamicin	81%
piperacillin	43%
Imipenam	2.5%



Graph 1: Graphical presentation of resistance (%) towards various antibiotics

In every age group, predominance was seen among the males. Our's is a male dominated society, where male report to the hospitals more often than females. Moreover most of the affected male patients were fields-workers and agriculturists. Arfas et al reported predominance of males (68%) in their study[5]. Other workers have observed majority of isolates from hospitalized patients to be *Pseudomonas aeruginosa* [6].

The present study highlights that the *Pseudomonas aeruginosa* remains an important cause of nosocomial wound infections. The incidence of beta lactamases producing *Pseudomonas aeruginosa* is on the rise. Though, metallo beta lactamases are the main enzymes in *Ps.aeruginosa* but ESBLs are also found in these isolates. As regards the method of detection, there is no guideline for detection of ESBLs in *Ps.aeruginosa* from CLSI .We used a method of double disc potentiation using sulbactam as inhibitor of beta lactamase instead of clavulanic acid. As it has been shown that combination of cefoperazone and sulbactam has high in vitro activity for *Ps.aeruginosa* [7]. Also, Clavulanic acid which is

recommended in ESBL detection for other gram negative bacteria, can induce expression of cephalosporinase and antagonize the antibacterial activity in *Ps.aeruginosa*[8]. In this study, Multi drug resistant *Pseudomonas aeruginosa* were seen in most of the strains and majority showed resistance to the cefaperazone-sulbactam as well. Further, this study also reveals that resistance is developing to imipenem also. In a study on burn wounds from North India, 3 % resistance to imipenem in *Pseudomonas aeruginosa* strains has been reported [9]. Another study also reports 17.32 % resistance to imipenem [10].

CONCLUSION

Pseudomonas aeruginosa remains an important cause of nosocomial wound infections. is study thus gives the alarming signal for the future, making the therapeutic options more difficult. Strict infection control measures are to be followed to contain the so called water and soil organism as *Pseudomonas aeruginosa*.

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