

Original Article**ANTIMICROBIAL RESISTANCE PATTERN OF PSEUDOMONAS AERUGINOSA FROM SPUTUM SAMPLES AT A TERTIARY CARE CENTRE IN KANPUR****R. Sujatha¹, Deepak S¹, Nashra A²**

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ABSTRACT

Background: *Pseudomonas aeruginosa* is a gram negative, strict aerobes & non lactose fermenting bacilli. It plays an important role in hospital acquired (HAI) and opportunistic infection, due to some mechanism and factors it is involved in resistance to antimicrobial drugs.

Aim: To study the antimicrobial susceptibility pattern of *P. aeruginosa* from various clinical specimens. **Methods:** A cross sectional study was conducted from January to December 2018 in Rama Medical College, Hospital And Research Centre, Mandhana, Kanpur. A total of 615 sputum samples were collected from both in and out-patients. Sputum samples were collected as per standard procedure and were inoculated on Blood, MacConkey and Chocolate agar. The isolates were identified by standard protocols using biochemical tests. The antibiotic susceptibility pattern of each isolate was checked as per Clinical and Laboratory Standards Institute (CLSI) guidelines using *Kirby-Bauer's* disc diffusion method. **Results:** Out of 615 sputum samples, 354 (57.56%) were culture positive. Out of these a total of 71 (20.05%) strains of *Pseudomonas* were isolated, where 54.93% was from males and 45.07% were from females (Mean age was 44.29 ± 22.72 :). Highest sensitivity was seen to Amikacin (92.86%) followed by Meropenem (91.55%) while lowest sensitivity was seen to Cefoperazone + Sulbactam (16.9%). There were 39.44% MDR strains, out of which 25% were Extensively Drug Resistant (XDR) and 10.71% were Pan Drug Resistant (PDR). In vitro susceptibility of MDR isolates showed highest sensitivity to Amikacin (82.14%) followed by Carbapenems (78.57%). All MDR isolates were resistant to Cefoperazone + Sulbactam. Resistance to Piperacillin + Tazobactam was 96.43%.

Conclusion: According to the present study, Carbapenem group of drugs such as Imipenem & Meropenem are more effective antimicrobial drugs which help to treatment of HAI & opportunistic infected patients.

INTRODUCTION

Multiple antibiotic resistance in bacterial populations is a pervasive and growing clinical problem, which is recognized as a threat to public health. Hence, there is a need to conduct area-specific monitoring studies to profile different pathogens responsible for specific infections and their resistance patterns, so as to generate data that would help clinicians to choose the correct empirical treatment.

Pseudomonas aeruginosa (*P. aeruginosa*) is an epitome of opportunistic nosocomial pathogen, which causes a wide spectrum of infections and leads to substantial morbidity in immunocompromised patients. Despite therapy, the mortality due to nosocomial pseudomonal pneumonia is approximately 70%.[\[1\]](#) Unfortunately, *P. aeruginosa* demonstrates resistance to multiple antibiotics, thereby jeopardizing the selection of appropriate treatment.[\[2\]](#) Therefore, the present study was undertaken to find out the antibiotic susceptibility patterns of pathogenic isolates of *Pseudomonas aeruginosa* from various specimens of hospital acquired infections (HAI).

MATERIAL AND METHODS:

A cross sectional study was conducted from January to December 2018 In . A total of 615 sputum samples were collected from both in and out-patients. Sputum samples were collected as per standard procedure and were inoculated on Blood, MacConkey and Chocolate agar. The isolates were identified by standard protocols using biochemical tests. The antibiotic susceptibility pattern of each isolate was checked as per Clinical and Laboratory Standards Institute (CLSI) guidelines using *Kirby-Bauer's* disc diffusion method.

RESULTS

Out of 615 sputum samples, 354 (57.56%) were culture positive. Out of these a total of 71 (20.05%) strains of *Pseudomonas* were isolated, where 54.93% was from males and 45.07% were from females (Mean age was 44.29 ± 22.72 :). Highest sensitivity was seen to Amikacin (92.86%) followed by Meropenem (91.55%) while lowest sensitivity was seen to Cefoperazone + Sulbactam (16.9%). There were 39.44% MDR strains, out of which 25% were Extensively Drug Resistant (XDR) and 10.71% were Pan Drug Resistant (PDR). In vitro susceptibility of MDR isolates showed highest sensitivity to Amikacin (82.14%) followed by Carbapenems (78.57%). All MDR isolates were resistant to Cefoperazone + Sulbactam. Resistance to Piperacillin + Tazobactam was 96.43%.

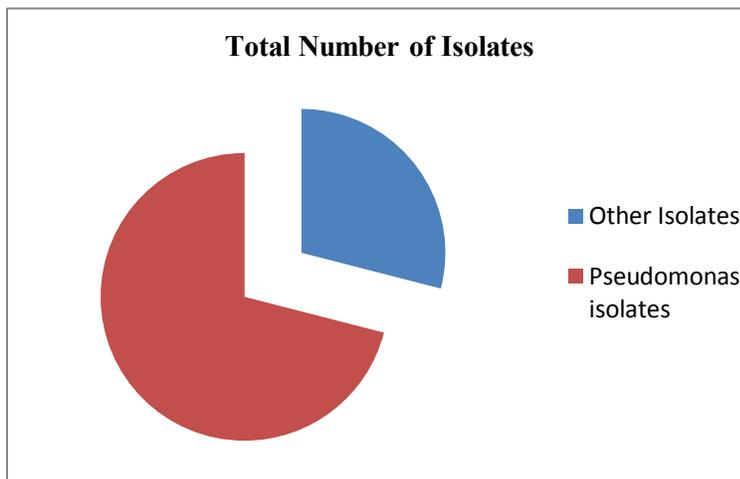


Fig 1: Total Number Of Isolates

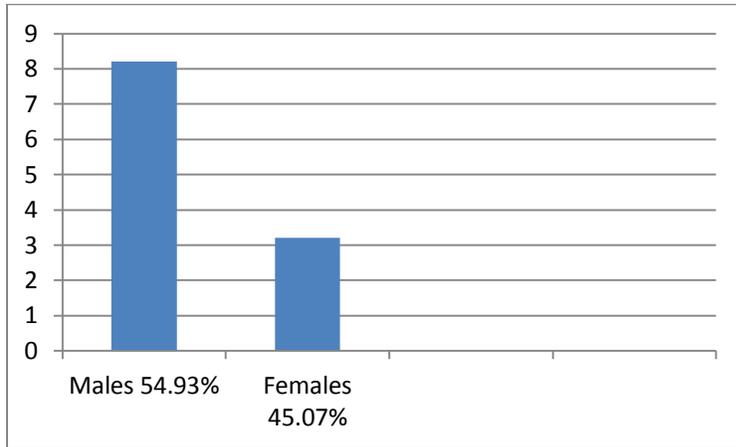


Fig 2: Sex Wise Distribution

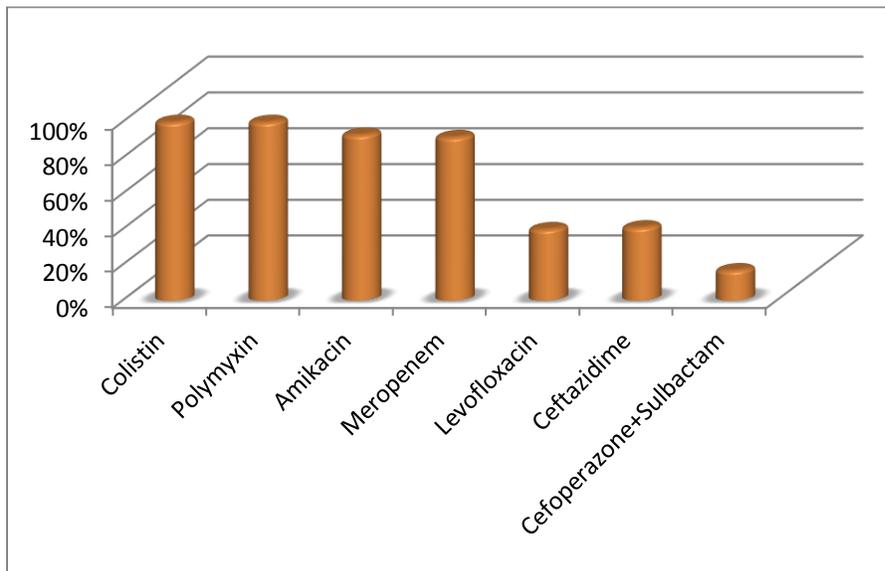


Fig 3: Sensitivity of the Antibiotics

Discussion

P. aeruginosa is inherently resistant to many antimicrobial agents, mainly due to the synergy between multi-drug efflux system or a type I AmpC β -lactamase and low outer membrane permeability. [3-5]. The age- and sex-wise distribution of patients diagnosed with infection followed the natural epidemiological pattern [6]. In our study we found that out of 615 sputum samples, 354 (57.56%) were culture positive. Out of these a total of 71 (20.05%) strains of

Pseudomonas were isolated, where 54.93% was from males and 45.07% were from females (Mean age was 44.29 ± 22.72 :). Male predominance was seen in our study which is consistent with other studies published previously [7,8]. The result of the study revealed that *Pseudomonas* was seen in 20.05% of the total positive sputum cultures which is superior to a recent study done in Peshawar, Pakistan in 2015 by Abbas et al. Where they showed isolation from sputum samples to be 3.1%[9] and inferior to a study done in North Waziristan, in 2016 by Shah SN et al[10]

The frequency of MDR *Pseudomonas* in our study was 39.44% which is comparable to Abbas et al. In 2015 [9]. The MDR isolates showed 100% and 96.43% resistance to Cefoperazone + Sulbactam and Piperacillin + Tazobactam respectively, which is antithetical to Mansoor et al. in 2015 [11] where the aforementioned drugs had better sensitivities.

CONCLUSION

This study concluded that *Pseudomonas aeruginosa* is one of the commonly isolated organisms and it is becoming more resistant to commonly used antibiotics. Carbapenems and aminoglycosides were the two classes of drugs that showed best activity against *Pseudomonas*. The frequency of MDR strains in *Pseudomonas* is also on the rise. Since this study is limited to only one center in Kanpur, it is recommended to conduct a large scale study to find out the exact resistance pattern of our population. More rational use of antibiotics is required to counter the developing resistance among bacteria.

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