



Antimicrobial Susceptibility Patterns of Clinical Isolates of *Pseudomonas aeruginosa* Isolates from Patients of Respiratory Tract Infections in a Tertiary Care Hospital, Karachi

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Abstract

The current study was aimed to investigate pathogen burden and antimicrobial susceptibility of conventional use antibiotics against MDR *P. aeruginosa*. Sputum samples were collected by using non-probability sampling techniques from indoor and out-door patients; a total of 560 sputum samples were collected. Standard and specific microbiological methods were used to identify the clinical isolates. Antibiotic susceptibility pattern was determined by using the Kirby Bauer Disc-diffusion method. Clinical and Laboratory Standards Institute (CLSI) guidelines 2019 were used to process the samples.

Introduction

Antimicrobials are the salutary tool for treating a list of bacterial infections. Millions of lives have been saved because of antibiotic usage that is important progress in the field of medical sciences. Resistance development against antibiotics or other anti-infective agents is an important threat globally. [1,2] Therapeutic choices are limited due to persistence.

Resistance presents significant morbidity and mortality rates in human. According to the World Health Organization (WHO), antibiotic resistance has now become a major clinical concern and global public health problem in this era [3,4]. *Pseudomonas aeruginosa* (*P. aeruginosa*) is a versatile bacterium causing opportunistic and nosocomial infections. Center for Disease Control and Prevention (CDC) reported that infections caused by *P.*

aeruginosa are often hospital-acquired and associated with patients with immunological disorders such as cystic fibrosis and severe burns [5,6]. Multidrug Resistance (MDR) antibiotics by definition can be stated as "resistance to at least three or more than three antibiotics groups" [5]. Bacteria acquire this resistance through the production of efflux pumps, the formation of biofilm and production of Extended Beta-Lactamase Enzyme (ESBL), AmpC Beta Lactamases (AmpC), and mutational change in protein OprD, all these mechanisms are proposed for the development of resistance in *P. aeruginosa* against antimicrobials. Furthermore, in developing countries, the irrational prescription of antimicrobials without performing diagnostic susceptibility tests by physicians has increased the production of resistant strains. The threat of growing resistance by MDR strains is increasing morbidity or mortality rates and imposes grave concern to human health care costs.

Methods

An in-vitro preclinical study was conducted in the hospital of Karachi; samples were recruited by using consecutive sampling techniques from January to September 2019. The study got approval from the ethical review committee of the associated center. About 560 samples of sputum were collected from the patients with respiratory tract infections who either visited the out-patient department or admitted to the hospital ward.



There was no discrimination in the selection of gender and age of the patients. Samples showing double growth or contamination on agar plates were excluded from the study. Those patients who were reported a positive growth of *Pseudomonas aeruginosa* on culture test included in the study. The minimum sample size was ninety-five (n=95), calculated via sealed envelope software. Labeled sterile containers were used for the collection of samples of sputum. MacConkey's agar was used for inoculated and samples were incubated at 37°C for 24-48 hours. For detecting the organisms multiple biochemical tests including colony morphology Gram staining, positive oxidase reaction, production of pyocyanin on Mueller-Hinton agar (Oxoid UK), citrate utilization and growth at 42°C, were used by following standard protocol Incubation conditions for plates were 16-24 h at 35°C before analyzation of results; "commercially prepared fixed concentration paper antibiotic discs" were placed on an agar plate. Growth inhibition zones around each of the antibiotic discs were demarcated in accordance with CLSI guidelines (2018) and labeling was performed as sensitive or resistant. Antibiotic discs i.e.

Discussion

P. aeruginosa notorious infections have been marked with the highest priority for surveillance on the basis of parameters such as incidence, prevalence, mortality and morbidity rates, and chronicity of the disease. Available regimens for inhibition and treating the life-threatening infections due to clinical isolates of *P. aeruginosa* have demonstrated resistance to multiple antibiotics that have led to a few therapeutic antibacterial drugs as an option for treatment.

References

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