

Research Article

***Pseudomonas aeruginosa*; Antibiotics Susceptibility among Patients of Nosocomial infection in Hillah City, Iraq**

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Abstract

Background and Objectives: *Pseudomonas aeruginosa* is gram negative pathogens considered as the most challenging pathogen. It is one of the most important causative agents of nosocomial infections and difficult to eradicate due to acquired resistance to many antibiotics. The nosocomial infections by *P. aeruginosa* is considered a major healthcare problem and appearance resistant to many antibiotic.

Materials and Methods: This studied in 45 clinical isolates were cultured and identified. The *P. aeruginosa* test by disk agar diffusion method to profiles Antibiotic susceptibility

Results: The Results of disk sensitivity testing for *P. aeruginosa* showed 35 (77.7%) of *P. aeruginosa* isolates were sensitive to Cefotaxime, 7 (15.5%) were resistant and 3 (6.6%) of isolates showed intermediate resistance.

Conclusion: The high frequency of Ambiciline resistance was seen among our *P. aeruginosa* isolates. Since Piperacillin are considered as the last drugs used for treatment of *P. aeruginosa* infections, it is crucial to screen imipenem non-susceptible isolates in infection control and optimal therapy.

Keywords: *Pseudomonas aeruginosa*, Antibiotic, Nosocomial infection

Introduction

Pseudomonas aeruginosa is known for its ability to resist by a variety of antibiotics, Gram-negative bacterium causing various types of infections and can isolated from clinical specimens (Karadzic *et al*, 2006). These bacteria can cause many disease of its such as super fecal skin, nosocomial infection and other (Kipnis *et al*, 2006).

Pseudomonas aeruginosa is gram negative, obligate an aerobic and non-sporulation, is ubiquitous organisms widely distributed in soil, water and living hosts and motile through polar flagellum (Driscoll *et al*, 2007).

This organism is problematic because of impressive genetically encoded mechanisms of intrinsic resistance and the potential to mutate and gain resistance to current antibiotics (Al-Mashhadani, 2004).

Pseudomonas aeruginosa has a particular propensity for the development of resistance. It is naturally resistant to many antibiotics because of its relatively impermeable outer membrane and it can also easily acquire resistance, creating challenging therapeutic scenarios. All known mechanisms of β -lactam resistance can be found in this species namely: β -lactamase production, altered outer-membrane permeability, active efflux and altered penicillin

binding proteins (Dotsch *et al*, 2005). Emergence of multiple drug resistance *P. aeruginosa* appeared as a great problem in clinical settings due to limited therapeutic options (Falagas *et al*, 2006; Giske *et al*, 2008).

Materials and Methods

Bacterial isolates and Identification

A total of 40 non-duplicate clinical isolates of *P. aeruginosa* isolates were collected from Hilla Hospital teaching. Bacterial isolates were recovered from different clinical samples such as; bronchial fluid, ear, sputum and wound. The isolated bacterial cultures were processed on MacConkey agar plates and incubated at a temperature of 37° C for 24 hours to assess pigment production. The culture plates were processed using standard microbiological procedures, characteristics of *P. aeruginosa* was described after gram staining including pigments production, after incubation at 37 C Biochemical investigations were done include; motility, indole production test, methyl red test, voges-proskauer test, citrate, urease, oxidase, catalase and ability to growth at 42 C (MacFaddin, 2000 ; Ishraq *et al* 2014).

Antimicrobial Susceptibility testing

Antimicrobial susceptibility testing was performed by the disk agar diffusion method according to Clinical

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and Laboratory Standards Institute (CLSI) recommendations by using Muller Hinton Agar (Zhuo *et al* 2008)

The following antimicrobial disks (Mast Co. UK) were used for antimicrobial susceptibility testing; Amiciline, Piperacillin , aztreonam (10 µg), cefepime (30 µg), ceftazidime (30 µg), ceftriaxone (30 µg), cephalixin (10 µg), amikacin (30 µg), gentamicin (10 µg), Cephalexin , piperacillin (100 µg). *P. aeruginosa* ATCC 27853 was used as quality control in each run of antimicrobial susceptibility testing.

Results and Discussion

Frequency of isolates according to hospital wards were as follows; wound unit 7 (15.5%), otitis media 12 (26.6%), Burn 18 (40%), Bronchial fluid 3 (6.6%). *P. aeruginosa* is one of the most common causes of life-threatening and difficult-to-treat nosocomial infections (Jung *et al* 2004)

It was found that the most infections of this bacterium occur in the burn sputum patients in which it accounted for (40%) of these infections. Multidrug resistance has commonly been reported in nosocomial *P. aeruginosa* infections, community acquired data have less frequently been reported. For this reason, epidemiological studies on the prevalence and antimicrobial susceptibility pattern of the resistant isolates in different geographical settings would provide useful information in order to guide clinicians in their choice of therapy and to contribute to the global picture of antimicrobial resistance. It has been reported in local studies that the most dominant organism in burn infections was *P.aeruginosa* (Gaur *et al* 2008). In a study carried out on burn patients in Al-Hilla teaching surgical hospital/Iraq seemed to be in agreement with the results of this study that *P.aeruginosa* was found to be the most common pathogen in burn infections (Shepherd and Lindow 2009).

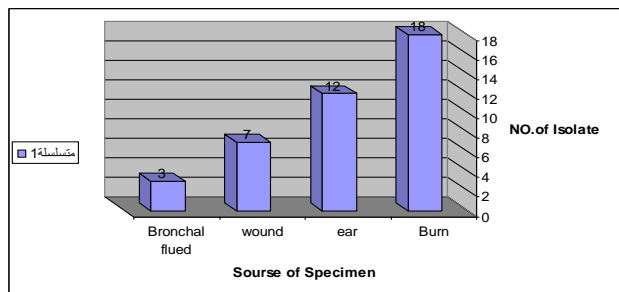


Fig.1 The *P. aeruginosa*. Isolate in Specimen sources

Antibiotic susceptibility

Antibiotic susceptibility results showed that 35 (77.7%) of *P. aeruginosa* isolates were sensitive to Cefotaxime , 7 (15.5%) were resistant and 3 (6.6%) of isolates showed intermediate resistance. These differences were statistically significant (Table 1). Resistance to antimicrobial agents appeared as a

great problem in clinical settings. Recently emerging carbapenem resistance in *P. aeruginosa* isolates have limited therapeutic options for treatment of MDR *P. aeruginosa* which are considered as the last line of drugs for treatment of infections caused by these organisms (Peng *et al* 2010; Abdi *et al* 2006) .In conclusion, the high prevalence of antimicrobial resistance observed among *P. aeruginosa* isolates underlines the strict consideration in antibiotics use at clinical settings. Therefore, it is important to perform antibiotic surveillance programs for appropriate empirical therapy and infection control practices. Increasing resistance to different anti-pseudomonal drugs particularly among hospital strains, has been reported world-wide (Orrett , 2004) and this is a serious therapeutic problem in the management of disease due to these organisms. The resistance profiles of *P. aeruginosa* to anti-microbial agents tested varied among the isolates investigated.

Table 1 Antibiotic susceptibility to the *P. aeruginosa* isolates

Resistant NO. %	Intermediate NO. %	Sensitive NO. %	Antibiotic
33 (73.3%)	12 (26.6%)	0 (0%)	Ambiciline
4 (8.8%)	23 (51.1%)	18 (40%)	Aztreonam
7 (15.5%)	3 (6.6%)	35 (77.7%)	Ceftazidime
0 (0%)	2 (4.4%)	43 (95.5%)	Piperacillin
13 (28.8%)	2 (4.4%)	30 (66.6%)	Cefepime
30 (66.6%)	4 (8.8%)	11 (24.4%)	Ceftriaxon
0 (0%)	1 (2.2%)	44 (97.7%)	Tobramycin
10 (22.2%)	1 (2.2%)	24 (53.3)	Gentamicin
9 (20%)	33 (6.6%)	33 (73.3%)	Amikacin
23 (51.1 %)	2 (4.4%)	20 (44.4%)	Cephalexin

Sex Distribution

In this study, the patients consisted of 34:45 (76.9%) males and 11:45 (24%) females, figure (2). Some studies have shown that males were more susceptible than females in the ratio of 8: (Malikunnisa and Begum.,2005) Previous studies have shown that males were more susceptible than females in the ratio of 2:1, which is in accordance with the current study. Predominance of male over female patients as shown in the study can be explained by the fact that in our province males are exposed more to the outside environment because of their mobility as compared to females.

This study has a few limitations. First, including the community acquired isolates of *P.aeruginosa* along with hospital isolates would have provided a much better picture of resistance patterns of strains in this geographical area. Second, it is essential to conduct a large scale study with newer anti-pseudomonal agents. Third, molecular typing and plasmid profile of the *P.*

aeruginosa isolates would provide the much needed details about the strains and lastly extended spectrum beta-lactamase (ESBL) producing *P. aeruginosa* which have become a major cause of nosocomial infections with MDR strains should be analyzed (Nwankwo and Shuaibo 2010).

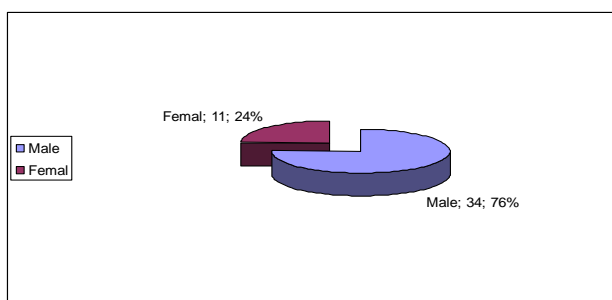


Fig.2 Sex Distribution for Patients isolate *P. aeruginosa*

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