Antibiotic Resistant *Acinetobacter baumannii* Isolated from Wounds Infections in Babylon Governorate

Zahraa A. Al-Ajeeli [1] , Habeeb S. Naher [2]

[1]M.Sc., Students, Al-Mustaqbal University College, Department of Pathological Analysis Techniques,
[2]Prof. Dr. Al-Mustaqbal University College, Department of Pathological Analysis Techniques.

Abstract

This project has been carried out during a period of three months, September 2019 to November 2019. One hundred swabs were collected from patients suffering from different wounds infections. Seven bacterial isolates have been identified as *Acinetobacter baumannii* using traditional diagnostic methods. The susceptibility of these isolates was determined towards seven antibiotics using disc diffusion test method. It was found that all isolates (100%) revealed remarkable resistance against Ampicillin and Cloxacillin, whereas the levels of resistance of those isolates were recorded at 71.4%, for each of Cefepime, clavulanic acid, kanamycin and gentamycin. The isolates exhibited a moderate susceptibility towards Amikacin which accounted for 57.1%. Azathromycin being more effective against *Acinetobacter baumannii* compared with other antibiotics included in this project since resistance of isolates accounted for only 14.2%.

Key words: *Acinetobacter baumannii, wounds infections, antibiotics resistant.*

Introduction

The genus *Acinetobacter* comprises a complex heterogeneous group of bacteria, many of which are capable of causing a series of infections. *Acinetobacter baumannii* is an important nosocomial pathogen among this genus, often associates with epidemic outbreaks of infections. This organism is frequently pan-drug-resistant and is capable of causing substantial morbidity and mortality in patients with underlying disease, both in the hospital and in the community [1] . *Acinetobacter* species have been implicated in a wide range of infections, particularly in critically-ill patients with impaired host defenses. These infections include pneumonia, skin and soft-tissue infections, wounds infections, urinary tract infections, meningitis, and bloodstream infections. Some nosocomial infections and hospital outbreaks have been attributed to *A. baumannii*, particularly in the intensive care unit (ICU) setting [2]. The main challenge with *A. baumannii* is its ability to acquire antimicrobial-resistance genes rapidly, leading to emerge multidrug resistance. Shakil and coworker, 2007 stated that *A. baumannii* is highly resistant several aminoglycosides represented by Amikacin, Arbekacin, Gentamycin, Kanamycin, Tobramycin and Apramycin [3]. Widespread use of antimicrobials within hospitals resulted in the emergence and increase of antimicrobial resistance among *Acinetobacter* strains, in particular, the wide use of extended-spectrum cephalosporins and quinolones. The ability of *A. baumannii* to acquire antibiotic resistance mechanisms has allowed this organism to persist in hospital environments and has facilitated the global emergence of MDR strains [4]. This study focuses on isolation and identification of *Acinetobacter baumannii* from patients with different wounds infections and determining its ability to resist a group of antibiotics.

Corresponding author:
Prof. Dr. Habeeb S. Naher.
E-mail: drnaherhabeeb@gmail.com

Materials and Methods

Antibiotics discs

Seven antibiotics discs were used in this study, all of them obtained from Bioanalyse/Turkey. These are; Ampicillin, Cloxacillin, Azithromycin, Cefepime clavulan, Gentamicin, Kanamycin and Amikacin

in concentration (mcg) of 10, 5, 15, 40, 10, 30 and 10 respectively.

Sampling

One hundred swabs were collected from patients suffering from wounds and burns from both sexes, males and females who admitted to AL-Hilla Teaching Hospital during the period from (September 2019 to November 2019). The samples were taken by touching the wound by sterile swab and put the swab in sterile plastic tube with cover then close the tube to avoid contamination. Then the swabs transferred to laboratory for bacteriological analysis by culturing on appropriate cultural media for identification**.**

Antibiotic susceptibility testing:

Disk diffusion test:

It was performed by using a pure culture of previously identified bacterial isolate. The most effective antibiotic for each bacterial isolate was determined as recommended by [5].

The inoculums to be used in this test was prepared by adding 5 isolated colonies grown on blood agar plate to 5 ml of nutrient broth and incubated at 35°C for 18 hours and compared with (0.5) McFarland standard tube ($1x10^9$, cells/ml.). A sterile cotton swab was used to obtain an inoculum from the bacterial suspension. This inoculum was streaked on a Mueller-Hinton agar plate and left to dry. Then, the antibiotic discs were placed on the surface of the medium at evenly spaced intervals with flamed forceps and incubated for 18 hours except cloxacillin was incubated for 24h at 37°C. Inhibition zones were measured using a ruler and compared with the zones of inhibition determined by [5].

Results and Discussion

Susceptibility of all *A. baumannii* isolates to seven antibiotics data presented in figure (3-6) showed a high level resistance of *A.baumannii* clinical isolates to most of the antibiotics under test. The present study revealed that all clinical isolates 100% resistance Ampicillin and Cloxacillin, whereas the resistance to cefepime clavulan acid, kanamycin and gentamycin at (71.4%). (57.1%) of isolates appeare resistance to Amikacin, and finally only (14.2%) were resistant to Azathromycin.

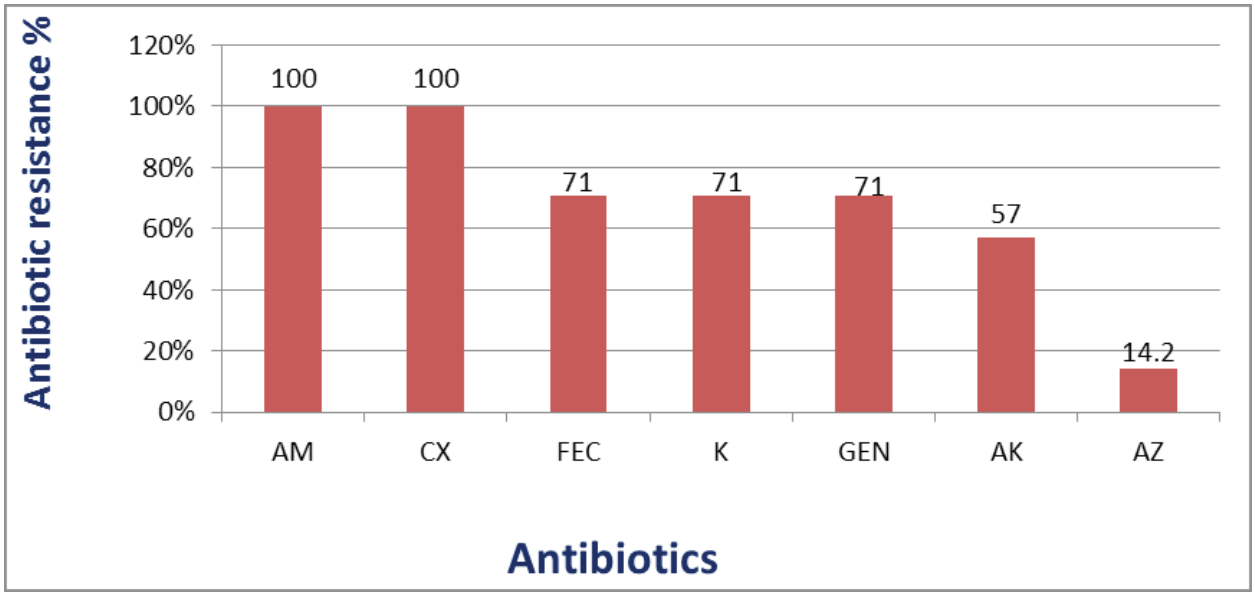

Figure-1 Antibiotic resistance profile of *A. baumannii* isolates

Ampicillin (AM), Cloxacillin (CX), cefepime-clavulanacid (FEC), kanamycin(K), gentamycin (GEN), Amikacin (AM), Azathromycin (AZ).

The antimicrobial susceptibility of *A. baumannii* was determined by disk diffusion method is in accordance with the clinical and laboratory standards institute guidelines (2012) depending on diameter of inhibition zone (mm).

The present study shows that the *A.baumannii* isolates had very high rates of resistance to the tested antimicrobial agents as shown in figure. These results were parallel with other results such as mentioned by Shakibaie [6] stated that the majority of isolates of *A.baumannii* spp, were highly resistant to the antibiotics most commonly used , including Ampecillin, cefepime clavulan acid, pipracillin and Cloxacillin.

A.cinetobacter spp. Showed a highly resistance reaching 80% to the majority of the antibiotic test [7].

In a local study done by Al-Mashhadani and colleagues [8] who found that *A. baumannii* clinical isolates developed 100% resistance to both Cloxacillin, ceftazidime.

Mohajeri and coworkers [9] pointed out that *A. baumannii* isolates revelead 53% resistance to Amikacin which is in accordance with the results of this study.

A. baumannii revealed resistant to ciprofloxacin and Cloxacillin Prashanth and Badrinath [10].

Most bacterial isolates were resistant to B-lactam antibiotics [11].

Goudarzi and colleagues 2013 [12] Showed that 70% of *A. baumannii* were resistant to Amikacin.

The antibiotic susceptibility patterns clearly showed the increasing resistance of *A. baumannii* to various antibiotics. Aliakbarzad, *et al* [13] showed that isolates of *A.baumannii* were resistant to aminoglycosides in rate reaching 81%,86% and 63% for Amikacin, gentamycin and tobramycin, respectively.

Aminoglycosides have been an important group of antibiotics in treatment of serious bacterial infections, especially those with aerobic gram negative bacteria. Resistance of *Acinetobacter* to aminoglycoside primarily results from inactivation of the antibiotic by specific modifying enzymes such as acetyltransferases, phosphotransferases and adenyltransferases.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Department of Pathological Analysis Techniques and all experiments were carried out in accordance with approved guidelines.

References

1. Visca P, Seifert H, Towner K. "Acinetobacter infection--an emerging threat to human health". IUBMB Life. 2011; 63 (12): 1048–54.
2. Levine M, Kotloff K, Nataro J, Muhsen K. The Global Enteric Multicenter Study (GEMS) impetus, rationale, and genesis. Clin. Infect. Dis. 2012; 55(4):215–224.
3. Shakil S, Zarrilli R, Khan A. Aminoglycosides versus bacteria_ a description of the action, resistance mechanism, and nosocomial battle ground.J. biomedical. Sci. 2007; 15(1): 5_14.
4. Lahiri K, Mani N, Purai S. *Acinetobacter* spp.as Nosocomial Pathogen Clinical Significance and Antimicrobial Sensitivity. 2004; 60(1):7-10.
5. Clinical and Laboratory Standards Institute (CLSI). 2012; 27-S4.
6. Shakibaie M. Antibiotic resistant pattern and E.S.B.L. production among Acinetobacter sPP. Isolated from I.C.U. of a hospital in kerman, Iran. Antibiotic Resistant. Infect. control. 2012; 1:1-8.
7. Borcan E, Ghita C, Chifiriuc M, Marutescu L, Isar C, Lazar V. Antibiotic resistance of gram negative bacilli strains isolated from the intensive care unit in fundeni clinical institute, Bucharest, Romania. Roum Arch Microbial Immunol. 2009; 68: 228-234.
8. Al-Mashhadani M, Hewson R. Antimicrobial resistance in Salmonella infections associated with foreign travel. 2010; 24(5): 214-233.
9. Mohajeri P, Farahani A, Feizabadi MM. Antimicrobial susceptibility profiling and genomic diversity of *Acinetobacter baumannii* isolates: A study in western Iran. *Iran.* J. Microbiol. 2013; 5:

195-202.

10. Prashanth K, Badrinath, S. In vivo susceptibility patrens of *Acinetobacter* species to commonly used cephalosporins , quinolones and aminoglycosides .Indian J.Med. Microbiol. 2004; 22: 97-103.
11. Soroush S, Haghi-Ashtioni, MT. Antimicrobial resistance of nosocomial strain of Acinetobacter baumannii in childern's medical center of Tehran: a 6 years prospective study. Acta. Med. Iran. 2012; 48:178-84.
12. Goudarzi M, Douraghi Z, Ghalavand N. Assessment of antibiotic resistance pattern in Acinetobacter baumannii carrying bla oxA type genes isolated from hospitalized patients. Novel Biomed. 2013; 1(2): 54-61.
13. Aliakbarzad K, Farajnia S. Prevalence of Aminoglycoside resistance genes in *Acinetobacter baumannii* isolates. J. Microbial. 2014; 7(10): 11924.