

Epidemiological Aspect and Antibiotic Resistance Profile of *Acinetobacter baumannii* in the Resuscitation Department of Ibn Tofail Hospital CHU Med V

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Abstract

Background: Multidrug resistant *Acinetobacter baumannii*, (MRAB) is an important cause of hospital acquired infection. The purpose of this study is to evaluate the epidemiology and analyze the level of antibiotic resistance of Ab strains in the intensive care unit of the ibn Tofail Hospital of the Mohammed VI University Hospital of Marrakech.

Material and method: This study is a retrospective review of a city hospital epidemiology data base and includes 42 isolates of *Acinetobacter baumannii* (AB) from 120 patients. The antibiogram was performed according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) recommendations. **Results:** In our study, all bacteriological samples were taken from the intensive care unit. The mean age was 48.2 years with extremes ranging from 19 to 72 years. 88 patients were male (73.4% of all cases) and 32 female (26.6%). The most frequent reason for hospitalization in the intensive care unit was severe head trauma in 35 cases (29%). During the study period, out of 120 samples received, 42 Ab strains were isolated (35% of samples). These strains were mainly isolated from blood cultures (40%). **Conclusions:** The diffusion of multi-resistant Ab strains in intensive care units seems to be alarming, hence the need to implement an effective strategy to fight nosocomial infections.

Keywords: Acinetobacter, antibiotics, resistance, antibiogram.

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INTRODUCTION

Acinetobacter baumannii (Ab) is a pathogenic, opportunistic gram-negative coccobacillus that is often multi-resistant to antibiotics. This germ is responsible for severe nosocomial infections, particularly in the intensive care unit.

The history of *Acinetobacter* is marked by an impressive evolution of antibiotic resistance in terms of speed and diversity of mechanisms and genetic materials involved [1].

In the 1970s, this bacterium was more often considered as a contaminant of bacteriological samples than as an agent responsible for infections. The current genus *Acinetobacter* includes about thirty species among which *A. baumannii* is the most represented in clinical bacteriology. From the 90's onwards, more and

more resistant epidemiogenic strains have been the cause of epidemic outbreaks [2-4].

The genomic study of *Acinetobacter* has greatly contributed to the knowledge of resistance mechanisms.

With the current rapid increase in the numbers of studies on *Acinetobacter baumannii*, the complexity of the entire picture regarding how this superbug copes with its environment and influences human beings is gradually being understood.

By conducting a thorough review of this topic, this paper aims to evaluate the epidemiology and analyze the level of antibiotic resistance of Ab strains in the intensive care unit of the ibn Tofail Hospital of the Mohammed VI University Hospital of Marrakech.

MATERIAL AND METHODS

This is a retrospective study based on the exploitation of the database of the Microbiology laboratory of Ibn Tofail Hospital Marrakech, carried out between January 2018 and December 2018 including all Ab strains isolated from patients hospitalized in the resuscitation services at Ibn Tofail Hospital. Isolation and identification were performed according to standard Bacteriology techniques,

Antibiotic susceptibility testing was performed according to EUCAST recommendations.

Data collection was performed using an operating form containing all the microbiological data of the patients.

Data analysis was performed using Excel 2016 software.

RESULTS

In our study, all bacteriological samples were taken from the intensive care unit. The mean age was 48.2 years with extremes ranging from 19 to 72 years.

88 patients were male (73.4% of all cases) and 32 female (26.6%), the sex ratio M/W=2.72.

The reason for hospitalization in the intensive care unit was severe head trauma in 35 cases (29%), polytrauma in 24 cases (20%), severe acute asthma in 8 cases (6.5%), diabetic ketoacidosis in 6 cases (5%), stroke in 5 cases (4%) and undetermined in 42 cases (35%).

Table 1: Epidemiological and clinical data

	Rate (%)
Sample (n=120)	
Age:	
Mean	48,2
Max	19 ans
Min	72 ans
Gender:	
Male	88 (73,4%)
Female	32 (26,6%)
Sex ratio (M/F)	2,72
Reason for hospitalization:	
Severe head trauma	35 (29%)
Polytrauma	24 (20%)
Severe acute asthma	8 (6,5%)
Diabetic ketoacidosis	6 (5%)
Cerebral vascular accident	5 (4%)
Undetermined	42 (35%)

During the study period, 42 Ab strains were isolated from 120 samples received, i.e. 35% of the samples.

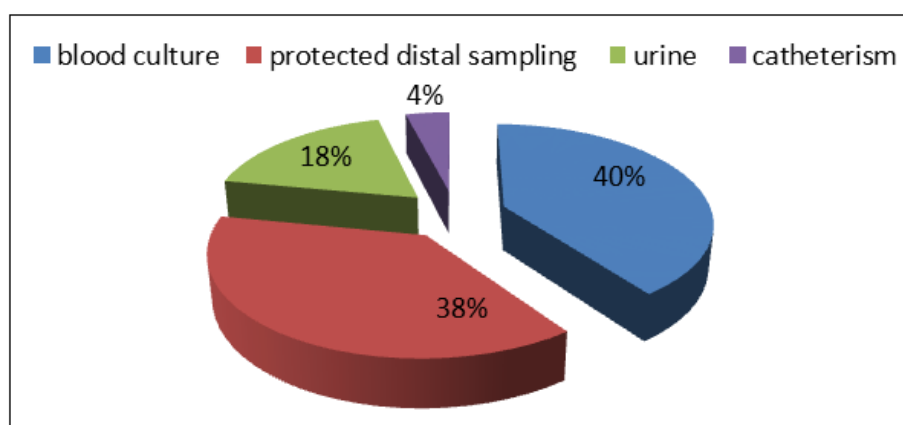


Figure 1: Distribution according to the type of sample

These stains were isolated mainly from blood culture (40%) followed by protected distal sampling (38%), urine (18%) and catheterism (4%).

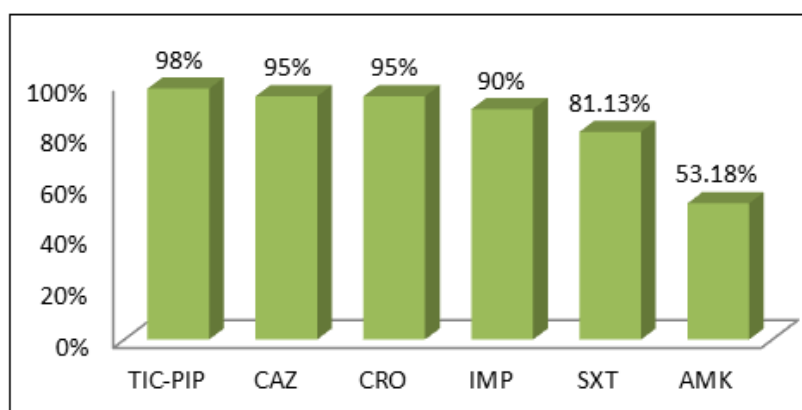


Figure 2: Resistance profile of AB strains to antibiotics

TIC: ticarcillin PIP: piperacillin CAZ: ceftazidime CRO: ceftriaxon IMP: imipenem SXT: sulfamethoxazol AMK: amikacin

The results of the antibiogram showed resistance to ticarcillin and piperacillin in 98% of the strains, to ceftazidime and ceftriaxone in 95%, to imipenem in 90%, to sulfamethoxazole in 81.13% and to amikacin in 53.18%.

20% of the strains showed intermediate susceptibility to Tigecycline. 6% of the strains showed resistance to Tigecycline and 74% kept susceptibility to Tigecycline.

DISCUSSION

Acinetobacter baumannii, a non-fermenter Gram-negative coccobacillus, was considered a low-category pathogen in the past, but has now emerged as a leading cause of hospital- and community-acquired infections. It is a frequent cause of pneumonia and septicemia in immunocompromised patients. It resists many classes of antibiotics by virtue of chromosome-mediated genetic elements on one hand, while it can also persist for a prolonged period in harsh environments (walls, surfaces, and medical devices) in the hospital settings on the other hand [5, 6].

A. baumannii can be transmitted through the vicinity of affected patients or colonizers such as linens fomites, curtains, bed rails, tables, sinks, doors, feeding tubes, and even medical equipment. Contamination of respiratory support equipment, suction devices, and devices used for intravascular access is the key source of infection [7].

A. baumannii is considered as a low-virulence pathogen, unless it is isolated from patients having comorbidities such as neonates with low birth weights and elderly patients with chronic illnesses such as malignancy. Major predisposing factors important in the acquisition of *A. baumannii* infection include prolonged hospital stay, mechanical ventilation, intravascular device, advanced age, immunosuppression, previous broad-spectrum

antimicrobial therapy, previous sepsis, I intensive care units stay, and enteral feedings [8].

Our study showed very high resistance rates for betalactam antibiotics, which is in line with other national and international studies, notably in a study conducted in Casablanca in 2016 (95%), in Fez in 2015 (97%), as well as in a Spanish study of 2010 (93.9% [9,10]). As for carbapenems, the percentage of isolation of resistant strains was very high, reaching 92%. These percentages are similar to those reported in Casablanca, Fez, Algeria, Greece and Brazil; on the other hand, low rates have been reported in Tunisia, France and particularly in Scandinavian countries such as Norway [11].

The antimicrobial resistance that characterizes *A. baumannii*, is related to its capacity to react rapidly to challenges issued by antimicrobials. Thus, the widespread use of antibiotic therapies in healthcare facilities, especially extended-spectrum cephalosporins and quinolones, represents an important factor to be considered [12]. In vitro susceptibility tests have become a useful tool for determining the adequate antibiotic treatment [13]. *A.baumannii*-associated nosocomial infections cause high mortality; thus, decreasing this mortality is a key therapeutic objective. In order to successfully overcome antimicrobial resistance, a wide variety of therapeutic combinations have been considered as first-line treatments [14].

CONCLUSION

A. baumannii has developed multiple antibiotic resistance mechanisms, increasing the harmful consequences of its pathogenic potential and representing an important challenge for patients and healthcare providers.

This diffusion of multi-resistant Ab strains in intensive care units seems alarming, hence the need to implement an effective strategy to control nosocomial infections through the respect of hygiene rules and the

rational use of antibiotics in order to reduce the diffusion of these strains in intensive care units.

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