Short Communication

Evaluation of Antimicrobial Susceptibility Among *Acintobacter baumannii* by E-Test Method at Khatam-Al-Anbia Hospital During 2013 - 2015

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Abstract

Background: Nosocomial infections are one of the health problems of modern societies, which are rising with unusual organisms. *Acintobacter*, which is the main cause of nosocomial infections such as pneumonia and nosocomial pneumonia, is caused by mechanical ventilation. *Acinetobacter* species are becoming resistant to antibiotics. One the most important agent of nosocomial infections with high mortality is infections by *Acinetobacter baumannii* which is Gram- negative opportunistic *Coccobacilli*. Treatment in these infections is difficult and sometimes impossible, due to multidrug resistance in strains isolated from nosocomial infections.

Objectives: The aim of the current study was to evaluate antibiotic resistance in A. *baumannii* isolates Khatam-Al-Anbia Hospital, Tehran, Iran.

Methods: In this cross-sectional study 100 of *Acintobacter baumannii* were isolated from hospitalized patients during 2013-2015 in Khatam-Al-Anbia hospital in Tehran. In this study samples of A. *baumannii* isolated from trachea, blood, urine, sputum and wound samples of patients bedridden in Intensive care unit (ICU) wards. Antimicrobial susceptibility and minimum inhibitory concentration (MIC) were determined by E-test methods. We used descriptive statistics to analyze the data by using SPSS 21 software.

Results: A total of 100 A. *baumannii* were isolated from clinical samples. The organism was resistant to rifampicin (46%), gentamicin (67%), meropenem (100%), piperacilin (98%), colistin (0%), and ceftazidin (96%).

Conclusions: The antibiotic resistance against most of the antibiotics especially meropenem is very high in this study. Moreover, colistin was most effective antibiotic to be used in A. *baumannii* infections. Colistin is the best choices for treatment of *Acinetobacter*.

Keywords: Acintobacter baumannii, Resistance, Susceptibility, E-Test Method

1. Background

Acinetobacter baumannii is a ubiquitous, non-fermenting, aerobic Gram-negative bacterium with intrinsic resistance to multiple antimicrobial agents [1, 2]. Nowadays the nosocomial infections due to *Acintobacter baumannii* have notably increased, although in past decades, these pathogen infections have been sporadically identified in hospitals. Due to its multidrug-resistance, morbidity and mortality in healthcare setting, this pathogen becomes important [3]. *Acinetobacter baumannii* can be detected in different environmental sources such as soil and foods. This pathogen sometimes can colonize the kin of healthy human, typically at a low-density and for short-term duration. Colonization of other body parts like the throat, nares, and the intestinal tract , was seen rarely in healthy human as well [4, 5]. *Acinetobacter* infections, mostly progress towards bacteremia, septicemia also lower respiratory tract involvement with *Acinetobacter*, are the most common source of infection in regards to *Acinetobacter* progression towards bacteremia and septicemia [6].

Acintobacer baumannii pathogen has known as important and common agent which is causing nosocomial pneumonia and bacteremia worldwide among patient who admitted in the intensive care unit (ICU) [7-9], which is isolated from skin, soft tissue, and urinary tract infection, and secondary meningitis over the past decades.

Over few last decades, the incidence of A. *baumannii* infections has increased , that may associated to increasing in the proportion of the susceptible population because of advancements in medical support of patients who are in critical situation [10, 11].

The rate of mortality of A. *baumannii* is around 7.8% to 23% for hospitalized patients with infection and the rate was 10% to 43% among ICU admitted patients [12]. If the infection caused by isolates with multiple classes of antimicrobial agents resistance, it seems that outcomes of this pa-

tients be poorer [13].

The aim of this research was to evaluate the antibiotic resistance in *Acintobacer baumannii* by using E-test at the Khatam-Al-Anbia hospital during 2013 - 2015.To deal with the above-mentioned issues, our objective was to inform about the antibiotic resistance in every region, to choose the correct treatment, and to take the necessary steps in preventing further resistance thereby reducing morbidity and mortality.

2. Methods

This is a cross-sectional study. During the project, the samples containing isolated *Acintobacer baumannii* were sent from different parts of the Khatam-Al-Anbia hospital in Tehran capital of Iran during 2013 - 2015. A. *baumannii* were examind on isolates of patients admitted at least 48 hours in the hospital. The specimens of patients included respiratory tube, urine, wound, and blood. The identification of A. *baumannii* and resistant pattern was done by using conventional bacteriological method and clinical laboratory and standards Institute (CLSI), respectively.

For all specimens, laboratory tests were performed including MacConkey and blood agar plates as routin, trypticase soy broth (TSB), and sub-cultured on chocolate agar for blood specimens, and chocolate agar for specimens other than urine. All of the suspected colonies were assessed by gram-staining, colonial morphology, negative oxidase, and other biochemical reactions [14].

E-test method which is recommended by clinical laboratory and standard institute (CLSI) was used to evaluate antimicrobial susceptibility of the isolate organisms. MICs (minimum inhibitory concentrations) were determined by the E-test method according to the manufacturer's guidelines (AB Biodisk). A suspension of each isolate in Mueller-Hinton broth, adjusted to the density of a 0.5 McFarland standard, was swabbed in three directions to ensure uniform growth onto Mueller-Hinton agar plates. Once the agar surface was completely dry, E-test strips were applied to each plate with sterile forceps, and the plates were incubated at 35°C for 16 to 20 hours. The MIC was read where inhibition of growth intersected the E-test strip. When small colonies grew within the zone of inhibition or a haze of growth occurred around MIC end points, the highest MIC intersect was recorded.

The ethics committee of School of Medicine, Shahid Beheshti University of Medical Sciences was approved this study. Statistical analysis was performed by using SPSS 21 software (SPSS Inc., Chicago, IL). A two-tailed P-value < 0.05 was considered statistically significant.

3. Results

Overall, 100 strains of A. *baumannii* were isolated from the hospitalized patients between 2013 to 2015 from ICU ward of Khatam-ol-Anbia Hospital, Tehran, Iran. The mean age of patients was 71.97 years in which 68 (68%) patients were men and 32 (32%) were female. Distribution of clinical samples were respiratory tract was the most common place 39% of *Acinetobacter* isolation including tracheal secretion (32.3%); sputum (6.7%); other common sites were blood (9.4%); wound (1.9%); CSF (13.2%); and catheter(3.8%) urine (32.7%).

The rates of resistance were 46% for rifampicin, 67% for gentamicin, 100% for meropenem, 98% for piperacilin, 0% for colistin, and 96% for ceftazidin.

4. Discussion

In this study, the antibiotic resistance against most of the antibiotics especially meropenem is very high. Moreover colistin was most effective antibiotic to be used in A. *baumannii* infections. Colistin is the best choices for treatment of *Acinetobacter*.

Acinetobacter baumannii is a pathogen that is opportunistic and involved in a large number of hospital-acquired infections and Couse of increasing mortality and morbidity [15]. Nowadays, nosocomial infection with multidrug-resistant *Acinetobacter* is important problems in the world, which are facing wide spectrum antibiotics, have become resistant. Since the 1970s, the spread of multidrug-resistant (MDR) *Acinetobacter* strains have become an increasing cause of concern among critically ill, hospitalized patients, and subsequent epidemics [4].

Today we are facing with the problem of dominance of *Acinetobacter baumannii* [16] which our study also reached to the same result. Same as other studies our research showed that *Acinetobacter* has the most relation with respiratory system and most of the positive samples for *Acinetobacters* were obtained from respiratory secretions and the respiratory tract is the main source of *Acinetobacter* infection [17, 18].

In the present study drug resistance in *A. baumannii* isolates from ICU wards of hospital was very high, especially against meropenem piperacilin, and ceftazidin rate of 100%, 98%, and 96%, respectively. In Iran, many researches have been done about drug resistance of A. *baumannii* during recent years and they have found similar high resistant rate to most of the antibiotics [19, 20] likely to our study,in 2008, Feizabadi et al. investigated that prevalence of susceptibility of A. *baumannii* to imipenem, meropenem, piperacillin-tazobactam and

amikacin percentage of 50.7%, 50%, 42.1% and 38.2%, respectively. In 2009 Morovat et al. reported susceptibility of *A. baumannii* to cefotaxime, imipenem, meropenem, piperacillin, piperacillin-tazobactam, and tigecycline rates of 7.5%, 42.5%, 42.5%, 21.2%, 28.7% and 91.2% using E-test method [21].

Inappropriate prescription of highly used antibiotics for treatment of infections, has caused the emergence of multi-drug resistant pathogens including *Acinetobacter*, hence research results show the increasing resistance of *Acinetobacter* to highly used antibiotics [22, 23].

The studies which have been done in Iran and other countries have reporeted a pattern of increased antibiotic resistance, and we are facing to the emergence of multi-drug resistant (MDR) strains. This may because of prolonged hospital stays, irrational prescription of antibiotics, weakened immune systems because of underlying factors, and immune-system depressant drugs [24].

4.1. Conclusion

In conclusion, our study showed the antibiotic resistance of A. *baumannii* isolates in Khatam-Al-Anbia hospital during 2013 - 2015. It seems that the only way to manage this changing pattern is to approach it with rational broad-spectrum drug prescriptions and treatment of A. *baumannii* infections. This can be performed by giving appropriate instructions in different way like having broad-spectrum drugs prescribed only by specialists in infectious diseases, in addition have mandatory consultations to prescribe antibiotics and control the rate of resistance.

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Footnotes

Authors' Contribution: The core idea of this work came from Davood Yadegarynia and Dr. Hadi Kazemi. Dr. Sara Rahmati Roodsari and Zahra Arab-Mazar collected the data and acted as technical and material support.

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