Int J Biol Med Res. 2013; 4(1): 2726 - 2728

BioMedSciDirect Publications

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International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

Multidrug-Resistant (MDR) Acinetobacter: a Major Nosocomial Pathogen Challenging Physicians

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ARTICLE INFO

Keywords:
Drug resistance
Acinetobacter baumannii
Nosocomial infection

ABSTRACT

Abstract- There is increasing reports of emergence of multiple drug resistant (MDR) Acinetobacter spp. in the world. A. baumannii isolates from JJM Medical College hospital were studied in order to find the profile of antibiotic resistance. Among them, 40.6% (59/145) of A. baumannii isolates were identified as MDR. Overall susceptibility rates to ofloxacin, gentamicin, carbenicillin, cephotaxime, ceftazidime and ceftriaxone were 45.45%, 38.96%, 42.86%, 41.56%, 50.65% and 29.87%, respectively. The susceptibility rates to amikacin, ciprofloxacin, imipenem, and meropenem were57.14%, 58.44%, 67.53% and 71.42% respectively. Our findings also highlight the importance of clinicians' access to updated susceptibility data regarding A.baumannii in developing countries such as India.

1. Introduction

Acinetobacter species are becoming a major cause of nosocomial infections and can present major challenges for physicians. Of growing concern is the increase in multidrug resistance exhibited by clinically relevant species. A.baumannii is emerging as a cause of numerous global outbreaks, displaying ever-increasing rates of resistance1.Today, the increasing recovery of multi-drug resistant (MDR) A. baumannii in the nosocomial setting is a frightening reality2.

Acinetobacter are pleomorphic, encapsulated, aerobic, nonfermentative gram-negative bacilli. Acinetobacter species are ubiquitous, living in soil and water. The organism can survive for extended periods in the environment and tolerates both wet and dry conditions3. Acinetobacter utilizes a wide variety of carbon and other energy sources and grows well on routine laboratory media. There are over 20 species of Acinetobacter, although the species A. baumannii accounts for >80% of isolates causing human disease4. The organism can survive for months on clothing and bedclothes, bed rails, ventilators and other surfaces in the environment, including sinks and doorknobs, making nosocomial transmission extremely difficult to control.

Acinetobacter is an organism of low virulence, but it is capable of causing infections. A. baumannii is primarily a healthcare-associated pathogen commonly isolated from the hospital environment and hospitalized patients. It is increasingly reported as the cause of outbreaks and nosocomial infections such as blood-stream infections, ventilator-associated pneumonia (VAP), urinary tract infections (UTI) and wound infections5, 6, 7, 8.

Acinetobacter baumannii infections are often difficult to eradicate due to high level resistance to a wide range of antibiotics as a result of both intrinsic and acquired mechanisms9, 10. The objective of the present investigation was to assess the samples received from the JJM Medical college hospital in order to find the profile of antibiotic resistance among A.baumannii strains isolated from patients admitted in our hospital. Knowledge on incidence of MDR Acinetobacter may help physicians to properly treat infections due to MDR A.baumannii.

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2. Material and Methods

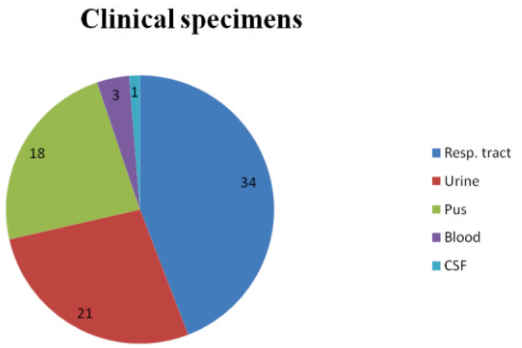
The present study was conducted at the Department of Microbiology, J.J.M.Medical College, Davangere. The study included 72 A. baumannii isolates from patients with nosocomial infections. All presumptive Acinetobacter isolates, which were oxidase-negative, non-lactose fermentative, and gram-negative coccobacilli, were identified as Acinetobacterbaumannii by using the conventional biochemical tests and growth potential at 37°C and 44°C. Biochemical tests used for detection of A. baumannii included growth on MacConkey medium, oxidation of glucose, hydrolysis of esculin, decarboxylation of lysine, hydrolysis of arginine, and reduction of nitrate[11].

Antimicrobial susceptibility tests

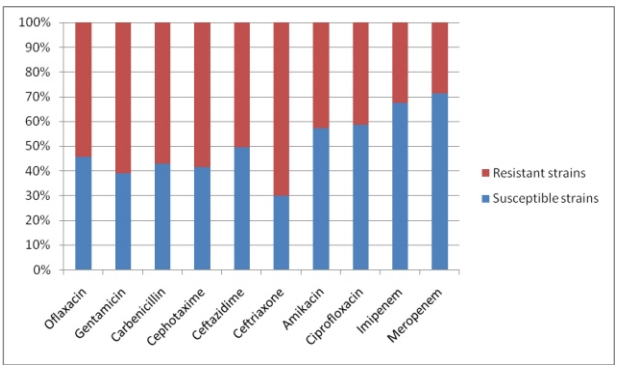
Antimicrobial susceptibility was determined by the Kirby-Bauer Disk diffusion Agar method according to NCCLS Standard guidelines12, 13. Quality control organisms were utilized routinely in the JJMMC hospital and Department of Microbiology laboratories to ensure accurate performance of the susceptibility tests. Owing to the high risk of nosocomial infections due to A. baumannii strains, isolates that showed intermediate susceptibility to an antimicrobial agent were categorized as resistant isolates for data analysis and presentation. We defined A. baumannii as MDR, when the organisms were resistant to all studied antimicrobial agents.

3. Results:

Totally, 77 strains were identified as A. baumannii, out of which 73 were isolated from patients with more than 48 hours of hospitalization (defined as nosocomial infections). Only 4 of them were isolated from outpatients (no nosocomial origin was documented). Sites from which A. baumannii was initially isolated included respiratory tract (34), urine (21), pus (18), blood (3) and CSF (1).



Overall susceptibility rates toofloxacin (45.45%), gentamicin (38.96%), carbenicillin (42.86%), cephotaxime (41.56%), and ceftazidime (49.35%) were less than 50%. The least effective drug was ceftriaxone (29.16%). The susceptibility rates to amikacin, ciprofloxacin,imipenem, and meropenem were57.14%, 558.44%, 67.53% and 71.42% respectively.



4. Discussion

At present, Acinetobacter spp., especially A. baumannii accounts for a substantial proportion of nosocomial infections. Recent trends indicate increasing antimicrobial resistance of Acinetobacter isolates, poising a serious threat to hospitalized patients 14, 15, 16, 17, 18.

The spread of antimicrobial resistance among Acinetobacter spp., in India has emerged as an important challengefor the Indian medical community. According toglobal surveillance reports, at present, Acinetobacter isolates are the best candidates for the study of antimicrobialsusceptibility among microorganisms responsiblefor nosocomial infections.

In present study, 73 (94.08%) strains were isolated from hospital admitted patients. These results were consistent with some other studies19.MDR A. baumannii infections tend to occur in immunosuppressed patients, in patients with serious underlying diseases, and in those subjected to invasive procedures and treated with broad-spectrum antibiotics20. More than 50% of A. baumannii strains were isolated from ICU. As shown inother reports, ICUs are high-risk areas for nosocomialinfections because of the severity of underlying diseases,the duration of stay and the use of invasive procedures21, 22.Although A. baumannii commonly causes nosocomial infections, community-acquired infections had also been reported. Community-acquired A.baumanniiinfections usually occur in immunocompramisedhosts including patient with advancedage or cirrhosis. The patients frequently presentedwith respiratory tract infections23, 24. In our study, 4patients acquired A. baumannii infections from thecommunity. Two of the 4 patients did not have anyunderlying diseases.

The present study showed that meropenem (71.42%) and imipenem (67.53%) were most effective drugs. Indeed, carbapenems are generally the last resort in the treatment of life threatening infections caused by Acinetobacterspp. because they are not affected by most β-lactamases, including extended-spectrum β-lactamases. However their efficacy is increasingly compromised by the emergence of carbapenem-hydrolysing β

–lactamase enzymes of Ambler molecular class B (metallo- β-lactamases) and D (oxacillinases) 25, 26. The least effective drug was ceftriaxone (29.16%). Overall susceptibility rates to ofloxacin (45.45%), gentamicin (38.96%), carbenicillin (42.86%), cephotaxime (41.56%), and ceftazidime (49.35%) were less than 50%. This may be attributed to the over use of these antibiotics in the hospital admitted patients.

This study had several limitations. Infection was not differentiated from colonization. Causation between multidrug resistanceand poor outcomes cannot be established or inferredfrom this study; additional analysis and data collection wouldbe required to control for confounding effects on the associationbetween multidrug resistance and outcome.

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