

Original Article

SYSTEMATIC REVIEW OF URINARY TRACT INFECTION CAUSED BY ACINETOBACTER SPECIES AMONG HOSPITALISED PATIENTS

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Abstract :

Introduction : Acinetobacter species have emerged as important nosocomial pathogens and have been known to cause different kinds of opportunistic infections. Acinetobacter species cause a wide variety of illness in debilitated and hospitalized patients especially in intensive care units (ICU). Because of frequent resistance to aminoglycoside's, fluoroquinolone's, ureidopenicillin's and third generation cephalosporin's, carbapenem are important agents in managing Acinetobacter infections.

Materials & Methods : A systematic retrospective analysis was performed on culture positive urinary tract infections among hospitalized patients between January 2010-December 2012. Significant isolates of Acinetobacter species were included in the study and was further analyzed for antimicrobial susceptibility, associated risk factors, underlying debility and co-morbid conditions.

Results : Among the 2240 culture positive samples, Acinetobacter species was isolated from 46 patients with UTI. Tigecycline was found to be the antibiotic with highest susceptibility (91%) followed by Imipenem (69.5%), Meropenem (67.3%) and Gatilfoxacin (63%). The six patients who expired had disseminated infection with highly resistant strains of Acinetobacter species. Mechanical ventilation was the predominant risk factor for severe and disseminated infection.

Conclusion : Acinetobacter infections are associated with high morbidity and mortality. Multidrug resistant Acinetobacter are common in hospitals, especially in ICU's. A feasible hospital antibiotic policy and strict adherence to it, rigorous surveillance and good hospital infection control programme is needed to control the increasing incidence of highly resistant Acinetobacter infections.

Keywords : Acinetobacter species, Mechanical ventilation, Nosocomial infections, carbapenems

Introduction:

Acinetobacter species have emerged as important nosocomial pathogens and have been known to cause different kinds of opportunistic infections. Acinetobacter baumannii is now recognized to be the Acinetobacter genomic species of great clinical importance¹. They are ubiquitous in nature and are highly resistant to commonly used antibiotics². Acinetobacter species cause a wide variety of illness in debilitated and hospitalized patients especially in intensive care units (ICU). These bacteria

survive for long time in the hospital environment, and there by the opportunity for cross infection are enhanced³. The main site of infection is the lower respiratory tract and urinary tract, and these

distributions are very similar to that of other nosocomial pathogens⁴. Septicemia due to Acinetobacter species is gaining importance in neonates⁵. Because of frequent resistance to aminoglycoside's, fluoroquinolone's, ureidopenicillin's and third generation cephalosporin's, carbapenem are important agents in managing Acinetobacter infections. However, there has been an alarming increase in carbapenem resistance in Acinetobacter species over the last decade⁶⁻⁹. It is difficult to explain the role of Acinetobacter acquisition in the ICU, since they are ubiquitous and have tremendous colonizing capacity. In addition, the risk factors for Acinetobacter acquisition may vary in different set up with epidemic outbreak of infection or endemic colonization^{1, 10}. The risk factors that are involved in acquisition of Acinetobacter infection, as reported by other investigators, are artificial ventilation, broad spectrum antibiotic therapy,

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endotracheal intubation, parenteral nutrition and intravascular catheterization⁵.

This study was conducted to determine the frequency of urinary tract infection (UTI) caused by *Acinetobacter* species in hospitalised patients, analyse their antimicrobial susceptibility and risk factors involved.

Materials and methods :

The study was conducted in the Department of Microbiology, K S Hegde Medical College and Hospital, Mangalore. A systematic retrospective analysis was performed on culture positive urinary tract infections among hospitalized patients between January 2010-December 2012. Significant isolates of *Acinetobacter* species were included in the study and was further analyzed for antimicrobial susceptibility, associated risk factors, underlying debility and co-morbid conditions.

Results :

During the period of January 2010 to December 2012, 6909 urine samples were received by the Clinical Microbiology laboratory. Of these, 2240 samples were culture positive, showing significant growth of bacteria or yeast like fungi. Among the 2240 culture positive samples, *Acinetobacter* species was isolated from 46 patients with UTI.

Among the 46 patients with *Acinetobacter* UTI, 24 were female and 22 were male patients. The mean age of the patients was 56.2 years. Twenty five patients were admitted to any one of the ICU for variable period of time during their hospital stay. The common causes for admission to ICU were Chronic Obstructive Pulmonary Disease (COPD) with diabetes mellitus (8), chronic kidney disease and acute kidney injury (6), stroke (5) and RTA/head injury (2). Of these 25 patients, *Acinetobacter* could also be isolated from blood in 4 patients and from respiratory specimen in 6 patients. Mortality was observed in 6 patients, which included 4 patients who were on mechanical ventilation. Two of the above patients had head injury due to RTA and their respiratory specimen yielded growth of *Acinetobacter* species. The other two deceased patients were admitted with chronic renal failure

and COPD with diabetes mellitus respectively.

The predominant risk factor was presence of urinary catheter in situ (35). The commonest reason for urinary catheterization was mechanical ventilation (11) for respiratory failure secondary to post surgical complication, chronic renal disease, acute kidney injury and neurosurgical procedures. Other risk factor included prolonged hospital stay and extended use of antimicrobial agents. Diabetes mellitus was the most common (27) co-morbid condition associated with UTI.

The antimicrobial susceptibility pattern of isolate is given in Table 1.

Discussion :

Acinetobacter species account for a substantial proportion of endemic nosocomial infection. Multidrug resistance increasingly reported in these pathogens is posing a threat to hospitalised patients. The acquisition of multi drug resistance is related to environmental contamination and contact with transiently colonized health care providers. Carbapenem's, like Imipenem and Meropenem, have been the drug of choice for treating infection caused by *Acinetobacter* species¹¹⁻¹³. In our study, Imipenem and Meropenem showed sensitivity of 69.5% and 67.3% respectively. The resistance to carbapenem may be mediated by hydrolysing enzymes such as OXA carbapenamases and metallo beta lactamases.

Tigecycline was found to be the antibiotic with highest susceptibility (91%) followed by Imipenem (69.5%), Meropenem (67.3%) and Gatilfoxacin (63%). Though no resistance to Polymyxin B and Colistin was noted in the current study, its clinical utility in treatment of UTI is very limited. Further, reporting of Polymyxin B and Colistin resistance can be made only by determining the MIC. Resistance to 3rd and 4th generation cephalosporin's (82%) and aminoglycoside's (74-78%) was uniform and very high.

Nitrofurantoin, which is widely used in treatment of uncomplicated UTI caused by Enterobacteriaceae, was not

found efficacious in treatment of Acinetobacter UTI.

The six patients who expired had disseminated infection with highly resistant strains of Acinetobacter species. Mechanical ventilation was the predominant risk factor for severe and disseminated infection. Four of the expired patients had Ventilator associated Pneumonia (VAP). Similar findings have been reported by studies, where Acinetobacter was responsible for 35% of VAP and majority of the patients were from ICU¹⁴.

Conclusion :

Acinetobacter infections are associated with high morbidity and mortality. Multidrug resistant Acinetobacter are common in hospitals especially in ICU's. Though carbapenem are drug of choice in treating these infections, such resistance profiles, as seen in the study, is alarming. Alternate drugs such as Tigecycline and Polymyxin B have their own limitation.

Thus, control measures should be taken that addresses the source of infection. Attention needs to be given to simple but effective hospital infection control practices such as hand hygiene, barrier precaution, environmental cleaning

and strict disinfection of patient care equipments. Unwarranted and unrestricted use of antibiotics should be checked as extended use of 3rd generation cephalosporin's is known to increase carbapenem resistance. A feasible hospital antibiotic policy and strict adherence to it, rigorous surveillance and good hospital infection control programme are needed to control the increasing incidence of highly resistant Acinetobacter infections.

Table 1 - Antibiotic susceptibility pattern of Acinetobacter species

Antibiotic	Sensitivity (%)
Amikacin	12 (26%)
Gentamicin	10 (22%)
Norfloxacin	06 (13%)
Gatifloxacin	29 (63%)
Cotrimoxazole	05 (11%)
Nitrofurantoin	06 (13%)
Cefotaxime	08 (18%)
Ceftriaxone	08 (18%)
Ceftazidime	08 (18%)
Cefipime	08 (18%)
Piperacillin - Tazobactam	08 (18%)
Imipenem	32 (69.5%)
Meropenem	31 (67.3%)
Tigecycline	42 (91%)
Polymyxin B	46* (100%)
Colistin	46* (100%)

*Susceptibility to polymyxin B and colistin should be confirmed by MIC test.

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