



Changing trends in the Antibiotic susceptibility pattern of Acinetobacter species isolated from clinical specimens over a period of five years from a tertiary care hospital

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ABSTRACT

Introduction: *Acinetobacter spp* has emerged as an important nosocomial pathogen worldwide. Antimicrobial resistance pattern of *Acinetobacter* vary according to species, country of isolation, region & period of time. But the overall trend is one of increasing resistance. Hence effective therapy must be individualised to reflect the periodic differences in regional, local & specific hospital resistance patterns, which makes constant monitoring of antibiogram of *Acinetobacter spp* essential.

Objectives: 1)To study the prevalence of *Acinetobacter spp* among various clinical samples over a period of 5 years 2)To assess the prevalence of multidrug resistance among the *Acinetobacter* isolates 3)To study the changing trends in the susceptibility pattern of *Acinetobacter* isolates over a period of 5 years

Methodology: Retrospective analysis of the antibiogram of the *Acinetobacter spp* was done, which were isolated from various clinical specimens received in the Department of Microbiology in a tertiary care centre during a 5 year period from 2012 to 2016

Results: During the study period, a total of 46005 samples were received for culture, from which 583 (1.3%) *Acinetobacter spp* were isolated. The prevalence of MDR strains among *Acinetobacter* increased from 59% in 2012 to 76% in 2016. Analysis of the antibiogram of the *Acinetobacter* isolates showed a progressive decrease in the susceptibility to third generation Cephalosporins & Piperacillin. The most susceptible agents were Meropenem, Tobramycin & Cefoperazone-sulbactam.

Conclusion: MDR *Acinetobacter* infections in our institution have increased considerably over the past five years. The trends in the antibiotic susceptibility patterns needs to be constantly monitored as it will help to determine the emergence of drug resistance, to formulate antibiotic policies for empirical therapy and to curb the irrational usage of antimicrobials.

Keywords- *Acinetobacter* species, Prevalence, Multidrug Resistance, Antibiogram.

Introduction

Acinetobacter spp have emerged as an important nosocomial pathogen worldwide¹. They can cause life-threatening infections including pneumonia, bacteraemia, and meningitis and are established as a significant health care problem worldwide¹.

Antimicrobial resistance pattern of *Acinetobacter* vary according to species, country of isolation, region and period of time. But the overall trend is one of increasing resistance¹. Carbapenem resistance is also alarmingly increasing among the *Acinetobacter* isolates. Hence effective therapy

must be individualised to reflect the differences in regional, local and specific hospital resistance patterns at regular time intervals. This makes constant monitoring of antibiogram of *Acinetobacter* spp very essential².

Aims & Objectives

1. To study the prevalence of *Acinetobacter* spp among various clinical samples over a period of 5 years
2. To assess the prevalence of multidrug resistance among the *Acinetobacter* isolates
3. To study the changing trends in the susceptibility pattern of *Acinetobacter* isolates over a period of 5 years

Methodology

The study was conducted in the Department of Microbiology, in a tertiary care centre in Central Kerala. The study included *Acinetobacter* spp isolated from various clinical specimens in the Department of Microbiology over a period of 5 years, from the year 2012-2016. The antibiogram of the reported *Acinetobacter* spp in the above mentioned study period were recorded, numerically coded & entered into Excel spread sheet. An isolate was considered as MDR if it has shown non-susceptibility to at least one agent in three or more antimicrobial categories. Data was analysed using SPSS 16.0

Results

During the study period, a total of 46,005 samples were received for culture, from which 583 (1.35%) *Acinetobacter* spp were isolated. The isolation rate of *Acinetobacter* spp increased from 0.7% in 2012 to 1.35% in 2013 and thereafter remaining steady till 2016. Maximum number of *Acinetobacter* isolates was from Sputum (235/583, 40%). The prevalence of MDR strains among *Acinetobacter* increased from 59% in 2012 to 76% in 2016. Antibiogram analysis of the *Acinetobacter* isolates showed a progressive decrease in the susceptibility to third generation Cephalosporins & Piperacillin. Cotrimoxazole and Quinolones have showed a progressive decrease in susceptibility from 2012 to

2015, but an increased susceptibility was observed in 2016. Carbapenems, Tobramycin & Cefoperazone-sulbactam remained the most susceptible agents. But there was a decrease in the percentage susceptibility of Imipenem, Tobramycin & Cefoperazone-sulbactam, compared to the data from previous year.

Discussion

There has been a worldwide increase in the prevalence of *Acinetobacter* infections over the last two decades¹. The prevalence of *Acinetobacter* infections in India ranges between 1.4 to 5%^{3,4,5} & our study also shows a similar isolation rate (1.35%). In Asia and the Middle East, resistance rates are about 40% for Ceftazidime, 35% for Amikacin and 45% for Ciprofloxacin⁶. But our analysis reveals higher resistance rates for these antibiotics (80%, 50% & 70% respectively).

Literature review shows varied resistance patterns across our country^{3-5,7}. Carbapenem resistance rates in *Acinetobacter baumannii* have generally exceeded 40% throughout all of India^{8,9,10}. According to our study Carbapenems, Tobramycin & Cefoperazone-sulbactam are the most sensitive agents. But our study also shows a rising trend of Carbapenem resistance as Meropenem resistance rate has increased from 32% to 50% over last 5 years.

Certain studies have recommended combination therapy for *Acinetobacter* infections^{6,7}. However controlled studies are needed to evaluate the efficacy of combination therapy in empirical treatment before making any formal recommendations¹.

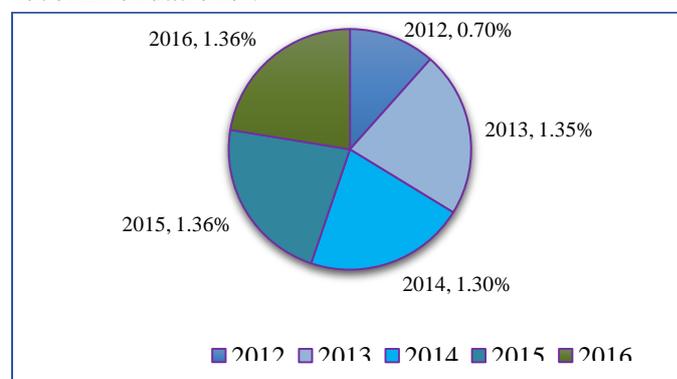


Fig. 1 Isolation rate of *Acinetobacter* spp from 2012-2016

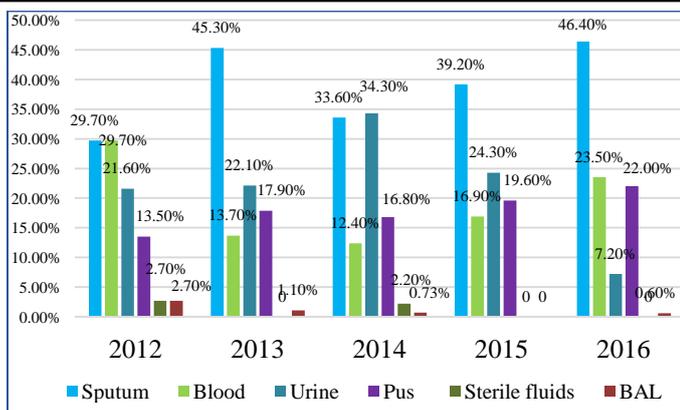


Fig. 2 Specimen Wise Isolation Rate Of Acinetobacter Spp from 2012 To 2016

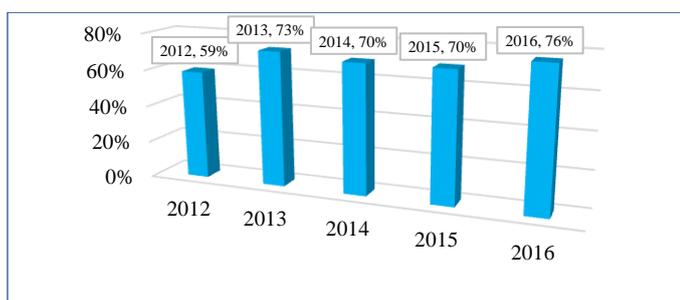


Fig. 3: Prevalence of MDR Acinetobacter from 2012 to 2016

Table 1: Percentage susceptibility of Acinetobacter spp from 2012 to 2016

Antibiotics tested	2012	2013	2014	2015	2016
Ceftazidime	41%	26%	16%	7%	13%
Gentamicin	46%	38%	43%	39%	48%
Piperacillin	32%	26%	16%	12%	10%
Pip -Tazobactam	37%	32%	41%	50%	45%
Cefotaxime	16%	13%	4%	5%	3%
Cefepime	48%	27%	39%	45%	43%
Amikacin	46%	40%	48%	54%	48%
Meropenem	32%	42%	39%	52%	50%
Imipenem	*	*	64%	46%	60%
Cefoperazone sulbactam	*	58%	68%	58%	55%
Tobramycin	*	*	44%	61%	61%
Cotrimoxazole	47%	42.6%	39%	28.5%	45%
Ciprofloxacin	47%	25.3%	28%	29.3%	33%

Conclusions

MDR Acinetobacter infections in our institution have increased considerably over the past five years. The trends in the antibiotic susceptibility patterns needs to be constantly monitored as it will help to determine the emergence of drug resistance, to

formulate antibiotic policies for empirical therapy and to curb the irrational usage of antibiotics. The resistance mechanism needs to be studied more as it may help in developing newer therapeutic strategies.

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