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Antimicrobial Sensitivity Pattern of *Acinetobacter* Species Isolated from Clinical Specimens

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A B S T R A C T

Acinetobacter species is emerging as a major cause of nosocomial and community acquired infections. To study the resistance pattern of *Acinetobacter* species. The study was carried out in the Department of Microbiology, Navodaya Medical College, Raichur from December 2013 to November 2014. Out of 5255 clinical samples processed, *Acinetobacter* species was identified by standard microbiological methods. Modified Kirby Bauer method was used for testing the sensitivity of *Acinetobacter* species against 11 antimicrobial drugs as per the CLSI guidelines 2011. 72(4%) revealed *Acinetobacter* species out of total 1786 (34%) culture positives. Isolation was maximum in pus (47%), followed by sputum(17%), urine(14%), blood(12%), CSF(10%). The sensitivity pattern of *Acinetobacter* species in this study shows maximum sensitivity to Meropenem (86%), followed by Piperacillin Tazobactam (76%), Amiakacin (67%), Ampicillin Sulbactum(58 %), Gentamicin (50%), Ciprofloxacin (49%), Ceftazidime (40%), Tetracycline (31%), Cotrimoxazole (29%), Ceftriaxone (21%) and Cefepime (18%). Development of resistance to commonly used antibiotics has lead to difficulty in treatment of *Acinetobacter* infections. This type of hospital based data might help to improve the knowledge of antibiotic resistance patterns in this region.

Introduction

Acinetobacter have been implicated in a wide spectrum of nosocomial and community acquired infections (Jolly-Guillou, 2005). Emergence of this organism as a significant opportunistic pathogen is because of its ability to survive in any environment and rapid development of resistance to the commonly used antimicrobials (Towner, 1997). Development of resistance in this pathogen is mainly by the production of beta-lactamases and aminoglycoside-modifying enzymes (Robert *et al*., 2006).

Although it is considered as one of the commensals of the skin and respiratory tract, it can cause a variety of serious infectious diseases like pneumonia, urinary tract infections, endocarditis, wound infections, meningitis, and septicemia (Peleg *et al*., 2008). Gram negative bacteria are responsible for more than 30% of hospital

acquired infections as per the recent data from U.S. National Healthcare Safety Network. *Acinetobacter* species are the major gram negative bacteria in cases of ventilator –associated pneumonia (47%) and urinary tract infections (45%) (Afreenish *et al*., 2010).

Treatment of infections caused by *Acinetobacter* species should be based on antibiotic susceptibility pattern because several factors can lead to development of resistance (Halstead *et al*., 2007; Scott *et al*., 2007). Very few studies in India have warranted us to undertake this study to report the prevalence of *Acinetobacter* species, their antibiotic sensitivity pattern and their clinical significance.

Materials and Methods

This study was conducted in the Department of Microbiology, Navodaya Medical College, Raichur from December 2013 to November 2014. A total of 5255 clinical specimens such as pus, sputum, urine, blood and CSF received from patients admitted to various departments of the Hospital were initially inoculated on Blood agar and MacConkey agar media. Urine samples were inoculated on CLED medium. All isolates obtained were further processed by the routine microbiological and biochemical tests. Typical colonies were subjected to Gram staining, hanging drop, oxidase and catalase test. *Acinetobacter* was identified on gram staining as gram negative bacilli or coccobacilli, nonmotile, oxidase negative and catalase positive (Mindolli *et al*., 2010).

Modified Kirby-Bauer disc diffusion method was used for the antibiotic sensitivity testing according to the Clinical and Laboratory Standard Institutes guidelines 2011. The antimicrobial agents used are Ampicillin-Sulbactum (10 / 10 ug), Meropenum (10 ug), Gentamycin (10 ug), Ciprofloxacin (5 ug), Pipercillin – tazobactam (100 / 10 ug), Amikacin (30 ug), Tetracycline (30 ug), Trimethoprime – sulphamethoxazole (1.25 / 23.75 ug), Ceftazidime (30 ug), Cefipime (30 ug), Ceftriazone (30 ug) (CLSI, 2011).

Results and Discussion

Of the total clinical samples processed 1786 (34%) were culture positive and 3469 (66%) were culture negative. Overall *Acinetobacter* species were isolated in 72(45%) out of 1786 culture positives. The maximum number of *Acinetobacter* species were isolated from pus (34 out of 72) (47%), followed by 12 in sputum (17%), 10 in urine (14%), 9 in blood (12%) and least in CSF (7 out of 72) (10%) (Table 1)

Chronic obstructive pulmonary disease (COPD), bronchial asthma and respiratory failure were the common respiratory problems in most of our patients. Sensitivity pattern of *Acinetobacter* species to different antibiotics can be seen in Table 2, which shows most resistant drug was Cefepime (82%) and least resistant drug was Meropenem (14%).

In the present study 72 (4%) isolates of *Acinetobacter* spp recovered from 1786 positive cultures from different clinical specimens. The results of our study are comparable with Mindolli *et al*., in Karnataka (4.25%) and Hisham *et al*., in Libya (4.2%) (Mindolli *et al*., 2010 and Hisham *et al*., 2012). But higher prevalence rates of 14% and 9.6% were observed by Mostofi *et al*. in Tehran, Iran and Joshi *et al*. in Pune, India (Mostofi *et al.,* 2011 and Joshi *et al*., 2006) respectively.

Isolation rate was higher from pus. 12% were isolated from blood in our study which is slightly higher when compared to those from USA, France, Belgium (7-9.3%). Studies from various countries have shown

predominance of isolation from urine (21-27%), tracheobronchial secretions (24.8-48.8%) (Lahiri *et al*., 2004). In our study, *Acinetobacter* was isolated from urine (14%) and sputum (17%).

Antibiotic susceptibility pattern of *Acinetobacter* species against various antibiotics in the present study was maximum with Meropenem (86%), Piperacillin Tazobactam (76%), Amiakacin

(67%), Ampicillin Sulbactum (58%), Gentamicin (50%), Ciprofloxacin (49%), Ceftazidime (40%), Tetracycline (31%), Cotrimoxazole (29%), Ceftriaxone (21%) and Cefepime (18%). In a study conducted by Suri *et al*. *Acinetobacter* spp isolated from a neurosurgical unit was sensitive to ciprofloxacin, amikacin, cefotaxim and ceftriaxone (Suri *et al*., 2000). Singh *et al*. showed *Acinetobacter* which was sensitive to amikacin (Singh *et al*., 2002).

Table.1 Number of *Acinetobacter* species isolated from various specimens

Specimens	No. of *Acinetobacter* spp.
Pus	34
Sputum	12
Urine	10
Blood	9
CSF	7
Total	72

Table.2 Sensitivity pattern of *Acinetobacter* spp (n=72) to different antibiotics

Antibiotics	Sensitive (%)	Resistant (%)
Ampicillin sulbactam	42 (58)	30 (42)
Meropenem	62 (86)	10 (14)
Gentamicin	36 (50)	36 (50)
Ciprofloxacin	35 (49)	37 (51)
Piperacillin tazobactam	55 (76)	17 (24)
Amikacin	48 (67)	24 (33)
Tetracycline	22 (31)	50 (69)
Cotrimoxazole	21 (29)	51 (71)
Ceftazidime	29 (40)	43 (60)
Cefepime	13 (18)	59 (82)
Ceftriaxone	15 (21)	57 (79)

Prashanth and Badrinath from JIPMER Pondichery isolated *Acinetobacter* which was sensitive to amikacin and ceftazidime and resistant to ciprofloxacin and cefotaxime (Prashanth *et al*., 2004). Gladstone *et al*., from Vellore reported a prevalence of 14% carbapenem-resistant

Acinetobacter spp., isolated from tracheal aspirates (Gladsone *et al*., 2005). Prashanth and Badrinath showed gradually increasing resistance of *Acinetobacter* (Prashanth *et al*., 2006). As recently as in 2010, one study from Ahmedabad showed few were carbapenem resistant (Patel *et al*., 2010).

Some studies have shown higher resistance to carbapenem upto 89% of isolates (Jaggi *et al*., 2011). The difference in the sensitivity pattern was due to environmental factors and different patterns of antimicrobial usage.

In conclusion, infections caused by *Acinetobacter* are difficult to treat these days because of increasing drug resistance. Multifactorial approach consisting of rational use of antibiotics, antibiotic therapy according to the antibiogram results, basic infection control practices and continuous surveillance of antibiotic resistance is the need of the hour.

Acknowledgments

Conflict of Interest: None to declare.

Ethical Approval: Approval for study was passed from the institutional board of study meeting.

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