ANTIBIOTIC SENSITIVITY PATTERN OF ACINETOBACTER SPECIES ISOLATED FROM CLINICAL SPECIMENS IN A TERTIARY CARE HOSPITAL

SOHAILA MUSHTAQ, IFFAT JAVEID AND MUNAZA HASSAN
Department of Pathology, PGMI / Lahore General Hospital, Lahore

ABSTRACT

Introduction: Acinetobacter, once considered as opportunistic pathogen has recently been emerged as an important nosocomial pathogen world over, mostly involving patients with impaired host defense.[1] It is rapidly evolving toward multi drug resistance against commonly prescribed antimicrobials and is becoming major challenges for physicians.[2] *The aim of present study was to find sensitivity and resistance pattern of Acinetobacter species in our set up. It is a descriptive study, that was carried out in the Pathology Department, Post Graduate Medical Institute Lahore from June 2011 to May 2012.*

Material and Methods: This descriptive study was conducted in the department of Pathology, Post Graduate Medical Institute Lahore from June 2011 to May 2012. Total 6185 clinical specimens were inoculated. All isolations obtained were further processed and Acinetobacter species was isolated by the routine microbiological and biochemical tests. Antibiotic sensitivity test was done by modified Kirby – Bauer disc diffusion method according to the Clinical and Laboratory Standards Institutes guidelines 2011.

Results and Discussion: During the study period from June 2011 to May 2012 a total of 6185 specimen were received from Lahore General Hospital. Out of 6185 clinical samples processed 2180 (35%) were culture positive and 4005 (65%) showed no growth. Acinetobacter species isolated was 90 (4.2%) in 12 months from 2180 positive cultures. In the present study the susceptibility pattern of Acinetobacter species recovered from different clinical specimens against various types of antibiotics was maximum with Cefepime 70%, Meropenem 66%, Pipercillin / Tazobactam 66%, Amikacin 66% followed by Ampicillin – Salbactum 59%, Gentamycin 50%, Ciprofloxacin 50%, Ceftriaxone 44%, Ceftazidime 40%, Tetracycline 31% and Trimethoprime – sulfamethoxazole 22%. Acinetobacter species isolated was 90 (4.2%) in 12 months from 2180 positive cultures.

Conclusion: Acinetobacter species are becoming difficult to treat day by day due to increasing resistant isolates. These drug resistant infections can be minimise to some extend by judicial use of antibiotics and adopting strict infection control methods.

Key words: Acinetobacter, Antibiotic susceptibility.

INTRODUCTION

Acinetobacter, once considered as opportunistic pathogen has recently been emerged as an important nosocomial pathogen world over, mostly involving patients with impaired host defense.[1] It is rapidly evolving toward multi drug resistance against commonly prescribed antimicrobials and is becoming major challenges for physicians.[2] *Acinetobacter* is now recognized to be the species of great clinical importance being capable of causing life threatening infections including pneumonia, septicemia, wound sepsis, urinary infection, endocarditis and meningitis.[3]

Acinetobacter was first described in 1911 as *Micrococcus calco – aceticus*. Since then it has had several names becoming known as *Acinetobacter* in the 1950s. *Acinetobacter* genus consists of more than 30 species, of which *A. baumannii* and to lesser extent genomic species 3 and 13TU, are mostly associated with the clinical environment and nosocomial infection. Its natural habitats are water and soil; it has been also isolated from foods, arthropods and environment. In humans *Acinetobacter* can colonize skin, wounds and the respiratory and gastrointestinal tract. Some stains of *Acinetobacter* can survive environmental desiccation for weeks, a characteristic that promotes transmission through fomite contamination in hospitals.[4]

Resistance mechanism that expressed frequently in nosocomial strains of *Acinetobacter* includes ß-lactamases which are either chromosomally encoded or borne on plasmid or tranposons (GW Hanlon), alteration in cell wall channels (porins) and efflux pumps.[5] Currently, the term multidrug resis-

tance in reference to *Acinetobacter* does not have a standard definition. It is sometimes used to denote resistance to three or more classes of drugs that would otherwise serve as treatments for *Acinetobacter* infections (e.g. quinolones, cephalosporins and carbapenam). The term pan – resistance has used to describe strains of *Acinetobacter* that are resistant to all standard antimicrobial agent tested.[6]

Infections caused by antibiotic – susceptible *Acinetobacter* isolates have usually been treated with broad spectrum cehalosporins, β-lactamase inhibitor combinations (e.g. combination that includes sulbactum) or carbapenems (e.g. imipenem or meropenem) used alone or in combination with an aminoglycosides. The duration of treatment is generally similar to that for infections caused by other gram – negative bacilli and depends mostly on the site of infection. Resistance to carbapenem class of antibiotics makes multidrug resistant acinetobacter infections difficult to treat. For infections caused by multidrug resistant isolates, antibiotic choices may be quite limited; the most active agents in vitro are the colistin and polymyxin B. Clinicians abandoned polymyxins in the 1960s and 1970s due to problems of nephrotoxicity and neurotoxicity. The emergence of multidrug resistant gram – negative bacilli has brought polymyxins back into use in lower doses and different drug formulations.[7]

Acinetobacter is easily isolated in standard cultures but is relatively nonreactive in many biochemical tests commonly used to differentiate among gram negative bacilli. The term A. *calcoaceticus* – A. *baumannii* complexes sometimes used because it is difficult to differentiate among acinetobacter species on the basis of phenotypic characteristics. Identification within the genus is difficult and requires molecular methods and these organisms are rarely identified to the species level using appropriate methods.[8]

Table 1: *Number of Acinetobacter species isolated from clinical specimen inoculated.*

	No. of Specimen	*Positive Growth*	*Acinetobacter Species Isolated from Positive Growth*
June	504	210	3 (1.4%)
July	478	278	7 (2.5%)
Aug	431	180	5 (2.7%)
Sep	376	170	4 (2.3%)
Oct	458	125	6 (4.8%)
Nov	418	174	8 (4.5%)
Dec	518	106	12 (11.3%)
Jan	610	191	17 (8.9%)
Feb	608	151	11 (7.2%)
Mar	622	128	8 (6.2%)
Apr	531	196	6 (3.0%)
May	631	171	3 (1.7%)
Total	6185	2180	90 (4.1%)

AIMS AND OBJECTIVES

The aim of present study is to know the sensitivity pattern of *Acenitobacter* in our set up.

MATERIAL AND METHODS

This descriptive study was conducted in the department of Microbiology, Post Graduate Medical Institute Lahore from June 2011 to May 2012. A total of 6185 clinical specimens such as blood, Pus and CSF received from patients admitted to various departments of Lahore General Hospital were initially inoculated on Blood agar and MacConkey agar media. Urine samples were inoculated on CLED medium. All isolations obtained were further processed by the routine microbiological and biochemical tests. Typical colonies were enumerated, picked and examined further and these 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. They were inoculated on triple sugar iron to see the fermentation.[9]

Antibiotic sensitivity test was done by modified Kirby – Bauer disc diffusion method for the following antimicrobial agents according to the Clinical and Laboratory Standards Institutes guidelines 2011. Ampicillin-Salbactum (10 / 10 µg), Ceftazidime (30 µg), ciprofloxacin (5 µg), meropenum (10 µg), gentamycin (10 µg), Amikacin (30 µg), Pipercillin – tazobactum (100 / 10 µg), Cefipime (30 µg), Cephtriazone (30 µg), Tetracycline (30 µg) and Trimethoprime – sulphamethoxazole (1.25 / 23.75 µg).[10]

RESULTS

During the study period from June 2011 to May 2012 a total of 6185 specimen were received from Lahore General Hospital. In a total of 6185 clinical samples processed 2180 (35%) were culture positive and 4005(65%) showed no growth. *Acinetobacter* species isolated was 90 (4.2%) in 12 months from 2180 positive cultures as shown in Table 1. Frequency distribution of *Acinetobacter* species isolated month wise is shown in Fig. 1. Table 2 revealed number of *Acinetobacter*

species isolated from different clinical samples. Sensitivity pattern of *Acinetobacter* species to different antibiotics can be seen in Table 3 which shows most resistant drug was Trimethoprim – sulfamethoxazole (78%) and least resistant drug Cefepime (30%).

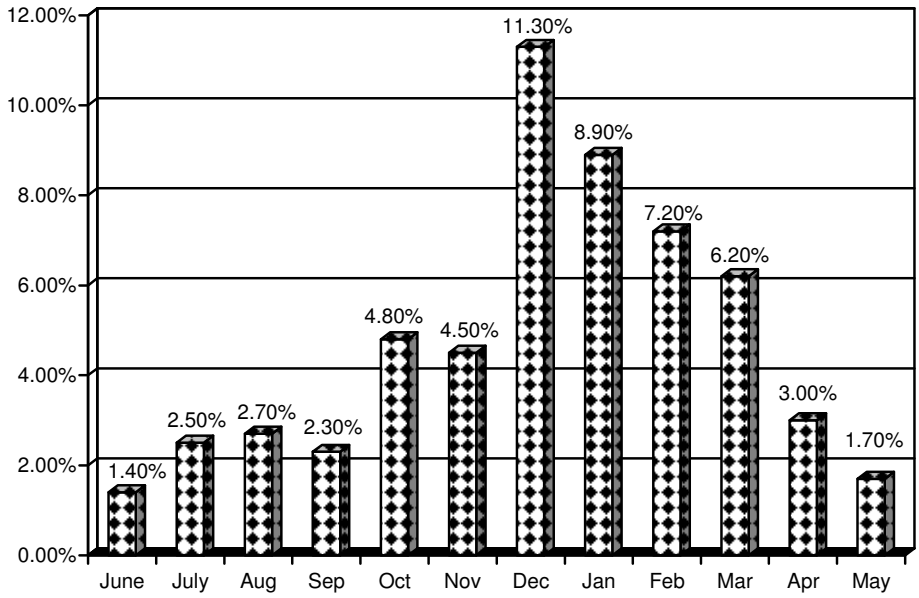

Figure 1: *Frequency distribution of Acinetobacter species isolated from positive growth.*

Discussion

Acinetobacter species has emerged as important pathogen with increased trend toward drug resistance. In the present study 90 (4.1%) isolates of *Acinetobacter* spp recovered from 2180 positive cultures from different clinical specimens.

The results of our study are comparable with Lone et al (2009) and Mindole (2009) in india where *Acinetobacter* species isolation rate was 4.8% and 4.25% respectively.[9,11] Whereas another study conducted by Oberoi et al (2009) in Ludiana India, *Acinetobacter* species isolated was8.4%.[12]

In the present study the susceptibility pattern of *Acinetobacter* species recovered from different clinical specimen against various types of antibiotics was maximum with Cefepime 70%, Meropenem 66%, Pipercillin / Tazobactam 66%, Amikacin 66% followed by Ampicillin – Salbactum 59%, Gentamycin 50%, Ciprofloxacin 50%, Ceftriaxone 44%, Ceftazidime 40%, Tetracycline 31% and Trimethoprime sulfamethoxazole 22%.

In a study conducted by Rahber et al (2010), the organism showed high rate of resistance to ceftriaxone (90.9%), piperacillin (90.9%), ceftazidime (84.1%), amikacin (85.2%) and ciprofloxacin (90.9%). Imipenem was the most effective antibiotic against *A. baumannii* and the rate of resistance for imipenem was 4.5%. The second most effective antibiotic was tobramycin, and 44.3% of *A. baumannii* isolates were resistant to this antibiotic.[14]

A study conducted by Lone R et al (2009) observed the increase in resistance to cephalosporine

Table 2: *Number of Acinetobacter species isolated from various specimen.*

Specimen	*Acinetobacter Species*
Pus	44
Blood	28
Urine	11
CSF	07
Total	90

Table 3: *Sensitivity pattern of Acinetobacter species to different Antibiotics n = 90.*

Antibiotics	*Sensitive n (%)*	*Resistant n (%)*
Ampicillin / Salbactum	53 (59)	37 (41)
Ceftazidime	36 (40)	54 (60)
Meropenem	59 (66)	31 (34)
Gentamycin	45 (50)	45 (50)
Ciprofloxacin	45 (50)	45 (50)
Pipercillin / Tazobactam	59 (66)	31 (34)
Amikacin	59 (66)	31 (34)
Cefepime	63 (70)	27 (30)
Ceftriaxone	40 (44)	50 (56)
Tetracycline	28 (31)	62 (69)
Trimethoprim – sulfamethoxazole	20 (22)	70 (78)

mainly Cefazoline 93%, Cefotaxime 66% and Ceftriaxone 61%. While Amikacin, Cefoperazone – Salbactum and Imepenem showed maximum level of susceptibility of 83%, 87.5% and 98.5% respectively may be due to recent induction of these antibiotics in the hospital where the study was carried out. The results of this study are not comparable with our study.[11] Similarly Shete V B et al (2009) also observed increase resistance towards cephalosporin (81 – 86%). This means probably the resistant isolates are increasing day by day due to indiscriminate use of these antibiotics in health care settings.[14] Shakibaie et al (2012) also reported many isolates of Acinetobacterspp. Resistant to almost all antibiotics routinely used in the ICU of our hospital, including imipenem, ciprofloxacin, and piperacillin + tazobactam.

It is ***concluded*** the infection caused by *Acinetobacter* species are becoming difficult to treat day by day due to increasing resistant isolates. These drug resistant infections can be minimised to some extend by judicial use of antibiotics and adopting strict infection control methods.

REFERENCES

1. Tabassum S. Multidrug-resistant (MDR) Acinetobacter: a major Nosocomial pathogen challenging physicians. Bangladesh J Med Microbiol 2007; 01 (02): 65-68.
2. Peleg AY, Potoski BA, Rea RR, et al. Acinetobacter baumannii bloodstream infection while receiving tigecycline: a cautionary report. J Antimicro Chemother 2007; 59: 128-31.
3. Zanetti G, Blanc DS, Federli I, et al. Importation of Acinetobacter baumannii into a burn unit: a recurrent outbreak of infection associated with widespread environmental contamination. Infect Control Hosp Epidemiol 2007; 28: 723-5.
4. Scott P, Deye G, Srinivasan A, et al. An outbreak of multidrug – resistant Acinetobacter baumannii – calcoaceticus complex infection in the US military health caresystem associated with military operations in Iraq. Clin Infect Dis 2007; 44: 1577-84.
5. Kwon KT, Oh WS, Song JH et al. Impact of imipenem resistance on mortality in patients with Acinetobacter bacteremia. J Antimicro Chemother 2007; 59: 525-30.
6. Lee NY, Lee HC, Ko NY, et al. Cl;inical and economic impact of multidrug resistance in nosocomial Acinetobacter baumannii bacteremia. Infect Control Hosp Epidemiol 2007; 28: 713-9.
7. Owen RJ, Li J, Nation RL, Spelman D. In vitro pharmacodynamics of colistin against Acinetobacter baumannii clinical isolates. J Antimicro Chemother 2007; 59: 473-7.
8. Marchaim D, Navon – Venezia S, Schwartz D, et al. Surveillance cultures and duration of carriage of multidrug – resistant Acinetobacter baumannii. J Clin Microbiol 2007; 45: 1551-5.
9. Mindolli PB, Salmani MP, Vishwanath G, Hanumanthappa AR. Identification and speciation of Acinetobacter and their antimicrobial susceptibility testing. Al Ameen J Med Sci 2010; 3 (4): 345-49.
10. Clinical and Laboratory Standards Institutes guidelines 2011.
11. Lone R, Shah A, Kadri SM, Lone S, Faisal S. Nosocomial Multi – Drug – Resistant Acinetobacter infections – Clinical findings, Risk factors and demographic characteristics. Bangladesh J Med Microbiol 2009; 03 (01): 34-38.
12. Oberoi A, Aggarwal A, Lal M. A decade of an underestimated Nosocomial pathogen – Acinetobacter in a tertiary care hospital in Punjab. J K Science 2009; 11: 24-26.
13. Rahbar M, Mehrgan H, Aliakbari NH. Prevalence of antibiotic – resistant Acinetobacter baumanni in a 1000 – bed tertiary care hospital in Tehran, Iran. BMC 2010; 53: 290-293.
14. Shete VB, Ghadage DP, Muley VA, Bhore AV. Acinetobacter Septicemia in neonates admitted to intensive care units. J Lab Physi 2009; 1: 73-6.