CLINICOMICROBIOLOGICAL STUDY OF INFECTIONS CAUSED BY ACINETOBACTER SPECIES

SRIDEVI SHRIDHAR, SEVITHA BHAT*
Department of Microbiology, Kasturba Medical College, Mangalore, Karnataka, India. Email: sevitha@rediffmail.com

Received: 14 December 2016, Revised and Accepted: 07 January 2017

ABSTRACT

Objectives: To study the rate of isolation of Acinetobacter species, its antibiogram and associated risk factors.

Methods: Retrospective time bound study for 6 months. The study included 191 consecutive clinical significant isolates of Acinetobacter species isolated from various specimens. The identification and antibiotic susceptibility testing by modified Kirby Bauer and Vitek Compact system 2.

Results: Maximum isolation of Acinetobacter species was from suction tip (31.94%), sputum (19.89%), urine (14.66%), blood (10.47%), and others. The species was most sensitive to colistin (97.87%) and polymyxin B (99.43%). The species was most resistant to imipenem (72.62%) and gentamicin (66.66%). The common risk factors were invasive procedure, duration of intensive care unit stay, and malignancies.

Conclusion: Acinetobacter has emerged as a major nosocomial pathogen. Antibiotic resistance is on rise. Proper antibiotic stewardship is required to curtail antibiotic resistance in this region.

Keywords: Acinetobacter spp., Antibiotic resistance, Health care associated pathogen

© 2017 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/) DOI: http://dx.doi.org/10.22159/ajpcr.2017.v10i4.16596

INTRODUCTION

Acinetobacter baumannii, non-fermenting Gram-negative bacilli has become an emerging pathogen especially in the hospitals owing to its ability to survive in adverse environmental conditions [1]. Acinetobacter species is associated with health care associated infections especially in patients on respiratory therapy equipment and indwelling catheters. The infections caused by this pathogen include pneumonia, septicemia, wound sepsis, urinary tract infection, endocarditis, and meningitis. A. baumannii is the most common species [2].

Antibiotic resistance and the ability of the organism to survive in the moist environment have contributed to the survival and spread of this pathogen in hospital settings [3].

The risk factors associated with Acinetobacter infections include presence of prosthesis, endotracheal intubation, intravenous catheters and prior antibiotic therapy, length of intensive care unit (ICU) and hospital stay, recent surgery, and invasive procedures [4].

The rate of antimicrobial resistance in this organism is very high, and thus the infections are difficult to treat. With the increase in the use of carbapenems to treat the resistant strains, there is a surge in the rates of carbapenem resistance. Use of polymyxin, colistin, and tigecycline is considered to treat the carbapenem resistant strains [5].

The knowledge of the prevalence and pattern of antimicrobial susceptibility pattern of Acinetobacter spp. is important [5,6].

The study is undertaken to evaluate the risk factors and antimicrobial resistance in Acinetobacter spp.

Aim

Clinicomicrobiological study of infections caused by Acinetobacter species.

Objective

1. To study the rate of isolation of Acinetobacter species
2. To study the antibiotic susceptibility pattern of Acinetobacter spp.
3. To study the risk factors associated with Acinetobacter spp. infections.

METHODS

A retrospective, hospital record-based study was undertaken from November 2015 to April 2016 in the central laboratory at KMC Hospital, Ambedkar circle, Mangalore.

The isolates of Acinetobacter species obtained from various clinical specimen: Exudate, urine, and blood from the patients were included in the study.

Processing of samples

All the samples for bacteriological culture were cultured aerobically on blood agar, chocolate agar, and MacConkey agar. Blood specimens were collected and incubated aerobically using BacT/ALERT system (bioMerieux, USA). Positive samples were sub-cultured by standard methods into blood agar, chocolate agar, and MacConkey's medium and aliquot was taken from positive bottles for Gram-stain. The identification and antimicrobial susceptibility testing of the isolates to antimicrobial agents was performed using the Vitek 2 system (bioMerieux, France) [4].

The study has been approved by the Institutional Ethics Committee.

RESULTS

During a period of 6-month, i.e., from November 2015 to April 2016, a total of 15611 clinical samples were received. Out of these samples, 191 (1.23%) of Acinetobacter spp. were isolated. Out of 191 samples, 111 samples (58.12%) were from inpatients, and 80 samples (41.88%) were from outpatients.

Maximum isolation of Acinetobacter species was from suction tip (31.94%), sputum (19.89%), urine (14.66%), blood (10.47%), and others.

Out of 191 isolates, 178 (93.2%) A. baumannii were isolated, 5 (2.6%) were Acinetobacter junii, and 8 (4.2%) were Acinetobacter lwoffii. The...
Table 1: Rate of isolation of Acinetobacter spp. isolated from different clinical specimen

| Specimen    | Number of isolates (%) |
|-------------|-------------------------|
| Sputum      | 38 (19.89)              |
| Wound swab  | 19 (9.95)               |
| Suction tip | 61 (31.94)              |
| Blood       | 20 (10.47)              |
| Urine       | 28 (14.66)              |
| Others      | 25 (13.09)              |

Table 2: Antibiotic resistance pattern of Acinetobacter spp.

| Antibiotics | Number of resistant isolates (%) |
|-------------|----------------------------------|
| Amikacin    | 65 (69.89)                       |
| Cefotaxime  | 66 (92.95)                       |
| Ceftriaxime | 112 (81.15)                      |
| Ceftriaxime | 112 (81.15)                      |
| Gentamicin  | 124 (66.66)                      |
| Imipenem    | 130 (72.62)                      |
| Meropenem   | 73 (76.84)                       |
| Piperacillin/tazobactum | 120 (69.36)                  |
| Polymyxin B | 0 (0)                            |
| Tigecycline | 13 (8.72)                        |

rate of isolation of Acinetobacter spp. was significant in inpatients and in the age group above ≥50 years, associated with comorbidities, and long hospital stay. Acinetobacter infection was seen more in males 116 (60.73%) compared to females 75 (39.27%).

In our study, the rate of isolation of Acinetobacter spp. from different clinical specimens is 1.23%. This statistic is similar to the findings of the study by Dash et al. in Odisha [9]. In other studies, the rates of MDR isolates were 29% and 54% in Bhattacharyya et al. in West Bengal and Mostofi et al. in Tehran [12,16].

In our study, we found that the Acinetobacter spp. isolates were most sensitive to colistin, polymyxin B, and tigecycline, a similar observation was done in Dash et al., Odisha [9].

**CONCLUSION**

Acinetobacter spp. has emerged as a major nosocomial pathogen. Antibiotic resistance is on rise. Proper antibiotic stewardship is required. This study will help in formulating better infection control strategies to combat antibiotic resistance in this region.

**REFERENCES**

1. Liu Q, Li W, Feng Y, Tao C. Efficacy and safety of polymyxins for the treatment of *Acinetobacter baumannii* infection: A systematic review and meta-analysis. PLoS One 2014;9(6):e89091.
2. Peleg AY, Seifert H, Paterson DL. *Acinetobacter baumannii*: Emergence of a successful pathogen. Clin Microbiol Rev 2008;21(3):538-82.
3. Yu Yu, Yang Q, Xu XW, Kong HS, Xu GY, Zhong BY. Typing and characterization of carbapenem-resistant Acinetobacter calcoaceticus - *Baumannii* complex in a Chinese hospital. J Med Microbiol 2004;53:653-6.
4. Sinha N, Agarwal J, Srivastava S, Singh M. Analysis of carbapenem-resistant Acinetobacter from a tertiary care setting in North India. Indian J Med Microbiol 2013;31(1):60-3.
5. Sunenshine RH, Wright MO, Maragakis LL, Harris AD, Song X, Hebdon J, et al. Multidrug-resistant acinetobacter infection mortality rate and length of hospitalization. Emerg Infect Dis. 2007;13:97-103.
6. Scott P, Deye G, Srinivasan A, Murray C, Moran K, Hulten E, et al. An outbreak of multidrug-resistant *Acinetobacter baumannii* calcoaceticus complex infection in the US military health care system associated with military operations in Iraq. Clin Infect Dis 2007;44(12):1577-84.
7. Mittal N, Nair D, Gupta N, Rawat D, Kabra S, Kumar S, et al. Outbreak of *Acinetobacter* spp septicemia in a neonatal ICU. Southeast Asian J Trop Med Public Health 2003;34(2):365-6.
8. Appleman MD, Belzberg H, Citron DM, Heseltine PN, Yellin AE, Murray J, et al. *In vitro* activities of nontraditional antimicrobials against multiresistant *Acinetobacter baumannii* strains isolated in an intensive care unit outbreak. Antimicrob Agents Chemother 2000;44(4):1035-40.
9. Dash M, Padhi S, Pattnaik S, Mohanty I, Misra P. Frequency, risk factors, and antibiogram of *Acinetobacter* species isolated from various clinical samples in a tertiary care hospital in Odisha, India. Avicenna J Med 2013;3(4):97-102.
10. Tripathi PC, Gajbhiye SR, Agrawal GN. Clinical and antimicrobial profile of *Acinetobacter* spp: An emerging nosocomial superbug. Adv Biomed Res 2014;3:13.
11. Vaja D, Kavathia D, Goswami D, Chouhan D. A prevalence study of *Acinetobacter* species and their sensitivity pattern in a tertiary care hospital Rajkot City of Gujarat (India): A hospital based study. IOSR J Dent Med Sci 2016;15(7):54-8.
12. Mostofi S, Mirnejad R, Masjedian F. Multi-drug resistance in *Acinetobacter baumannii* strains isolated from clinical specimens from three hospitals in Tehran-Iran. Afr J Microbiol Res 2011;5(26):3579-82.
13. Joshi SG, Litake GM, Satpute MG, Telang NV, Ghole VS, Niphadkar KB. Clinical and demographic features of infection caused by *Acinetobacter* species. Indian J Med Sci 2006;60(9):351-60.
14. Dent LL, Marshall DR, Pratap S, Hulette RB. Multidrug resistant *Acinetobacter baumannii*: A descriptive study in a city hospital. BMC Infect Dis 2010;10:196.
15. 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;3(1):34-8.