International Journal of Academic Research and Development
ISSN: 2455-4197; Impact Factor: RJIF 5.22
Received: 29-01-2019; Accepted: 28-02-2019
www.academicjournal.in
Volume 4; Issue 2; March 2019; Page No. 73-75

Isolation and identification of *Acinetobacter* species and its antibiotic resistance at a tertiary care hospital in Solapur, Maharashtra

Dr. Anu Sharma[1], Dr. PH Waghmare[2], Dr. Shaikh Najmeen Abdul Rauf[3], Dr. KV Ingole[4*], Dr. DP Danave[5]

[1, 2, 5] Assistant Professor, Department of Microbiology, Dr V.M. Govt. Medical College, Solapur, Maharashtra, India

[3] Post graduate student, Department of Microbiology Dr V.M. Govt. Medical College, Solapur, Maharashtra, India

[4] Professor & head, Department of Microbiology Dr V.M. Govt. Medical College, Solapur, Maharashtra, India

Abstract

Introduction: *Acinetobacter* species have become commonest cause of hospital acquired infections over the last two decades, causing serious life threatening infections. Over the time there has been emergence of multi drug resistant strains of *Acinetobacter spp.* which has led to limited therapeutic options for treatment of patient.

Aim: To identify & isolate *Acinetobacter* species from various clinical samples & to determine the antibiotic susceptibility pattern of these isolates.

Materials and Methods: The study was conducted in Microbiology department at a tertiary care hospital, Solapur, Maharashtra, over a period of 6 months. All samples received for culture and sensitivity, were processed according to standard protocols.

Results: Total 1291 samples received in Microbiology department for culture & sensitivity. 430 (33.3%) samples were sterile & 861(66%) samples were culture positive, of which 609 (66%) were gram negative isolates. Among gram negative isolates *Acinetobacter spp.* were 147 (17%) *Acinetobacter spp.* were most commonly isolated from wound swab (62%) followed by blood (12%), sputum (5.44%), CSF (4.76%), urine (4.08%). Antibiotic susceptibility pattern showed maximum resistance to Cefotaxime (89%), followed by Amoxicillin-sulbactam(87%), Piperacillin-tazobactam (80%), Amikacin(79.7%),Imipenem (77%), Ciprofloxacin (70%).

Conclusion: *Acinetobacter spp.* are commonly present in hospital environment and are MDRO, even to newer antimicrobials. Therefore rational use of antibiotics is important and necessary to prevent microbial resistance.

Keywords: *Acinetobacter spp.*, hospital infection, multi drug resistant organism (MDRO)

Introduction

Acinetobacter species are ubiquitous in nature once considered to be saprophytes over the time have emerged as an important pathogen causing hospital acquired infection and commonly responsible for hospital outbreaks in last few decades [1]. Human infections caused by *Acinetobacter spp.* include pneumonia, endocarditis, meningitis, skin & soft tissue infection, UTI and bacteremia [2]. These organism are widely distributed in hospital environment and difficult to eliminate as they survive on moist as well as dry surfaces [3] Multidrug resistant Acinetobacter baumanii (MDR-Ab) has become significant cause of hospital acquired infection (HAI) and Hospital acquired colonization (HAC) resulting in high rates of morbidity & mortality worldwide [4].

Immunosuppressed patients admitted in ICU are more prone to infection with (MDR-Ab) as they are subjected to broad spectrum antibiotics for prolong period, indwelling catheter and invasive processes predispose them to device related infection caused by MDR-Ab [5]. Due to the rapid emergence of resistance to multiple antibiotics, Carbapenems are the mainstay treatment for Multi Drug Resistant Organism infections. Due to overuse of this antibiotic group, resistance has developed leaving us with last resort to Colistin which has led to limited therapeutic options for treatment as it is often associated with side effects like neurotoxicity or nephrotoxicity in patients. The present study is undertaken to isolate the *Acinetobacter* species from various clinical samples and to determine the antibiotic susceptibility pattern of these isolates.

Material & Method

The study has been carried out for a period of 6 months from August 2018 to January 2019. All samples send for culture and sensitivity were included in the study. Samples were subjected to gram stain (except blood) for provisional report and then inoculated on blood agar and MacConkey agar and incubated at 37 °C for 48 hours before being reported as sterile. Growth on culture plate was identified as on basis of colony morphology and biochemical tests done as per standard protocols [6]. Antibiotic susceptibility testing was done by Kirby baeur disk diffusion method on Mueller Hinton agar as per CLSI guidelines [7].

Results

In the present study total 1291 samples were received in Microbiology department from August 2018 to January 2019 for culture & sensitivity. Out of which 430 (33.3%) samples were sterile & 861(66%) samples were culture positive, of which 609 (66%) were gram negative isolates and 28 (3.25%) were fungal isolates. Among gram negative isolates lactose fermenter gram negative bacteria were 359 (58.9%) and non-fermenter gram negative bacteria were 250 (41.05%). Among non-fermenter gram negative isolates (n=250) *Acinetobacter spp.* were 147 (59%) *Acinetobacter*

spp. were most commonly isolated from wound swab (62%) followed by blood (12%),sputum (5.44%), CSF (4.76%), urine (4.08%), tracheal aspirate 3.4%, Pleural fluid 3.4% and miscellaneous samples 4.0%. Infection caused by Acinetobacter spp. in hospitalized patients were most commonly seen among females 83 (56%) as compared to males 64 (44%). Most common age group affected was between 16 to 30 years (38%) followed by 31 to 45 years (20%), more than 60 years (18%), 1 to 5 years (15%), least number of cases were reported in age group 46 to 60 years.

Most of the isolates of *Acinetobacter spp.* were from patients admitted in Obstetrics & Gynaecology (28%) followed by Surgery wards (25%), Medicine wards (16%), ICU (includes all ICU's) (14%), Paediatrics (13%) and ENT (4%). Antibiotic susceptibility pattern of *Acinetobacter spp.* shows high resistance to Cefotaxime 89% followed by Amoxicillin-sulbactam 87%, Piperacillin–tazobactam 80%, Amikacin 79%, Imipenem 77%, Ciprofloxacin 70%, and Cotrimoxazole 35%.

Discussion

Acinetobacter is a nosocomial pathogen, its ability to infect healthy hosts and its ability to develop antimicrobial drug resistance is a cause for concern among clinician as MDR-Ab has left the physicians with limited therapeutic options which has resulted in increased morbidity & mortality among patients. In the present studies study total 1291 samples were received over a period of 6 months for culture & sensitivity. Out of which 430 (33.3%) samples were sterile & 861(66%) samples were culture positive, of which 609 (66%) were gram negative isolates. And 28 (3.25%) were fungal isolates. In the study done by Neetu Gupta *et al.* [9] culture positivity rate was 55% which is higher than the rate in present study, culture positivity rate may be variable, differences may be seen even between wards & ICU in the same hospital which can be multifactorial like patient factors, health care worker factors & even organism present in the hospital environment and there virulence may affect the patient outcome. Among gram negative isolates lactose fermenter gram negative bacteria were 359 (58.9%) and non-fermenter gram negative bacteria were 250 (41.05%). Among non-fermenter gram negative isolates (n=250) *Acinetobacter spp.* were 147 (59%), studies done by Neetu Gupta *et al.* [9] & Zeina A Kanafani *et al.* [10] shows variation from the present study in isolation rates of Acinetobacter spp. which is 38% & 84% respectively. Variation in isolation rate can be due to difference in the population under study, local infection prevalence, and local antibiotic prescribing habits of physician. Among non-fermenter gram negative isolates (n=250) *Acinetobacter spp.* were 147 (59%) *Acinetobacter spp.* were most commonly isolated from wound swab (62%) followed by blood (12%),sputum (5.44%), CSF (4.76%), urine (4.08%), tracheal aspirate 3.4%, Pleural fluid 3.4% and miscellaneous samples 4.0%. Study done by Chakravarti, D. N *et al.* [8] shows results in concordance to the present study. However studies done by Neetu Gupta *et al.* [9] & Zeina A Kanafani *et al.* [10] shows contrasting results to the present study where most common sample from which Acinetobacter spp. were isolated were Respiratory specimen & blood respectively.

Infection caused by Acinetobacter spp. in hospitalized patients were most commonly seen among females 83 (56%) as compared to males 64 (44%). Most common age group affected was between 16 to 30 years (38%) followed by 31 to 45 years (20%), more than 60 years (18%), 1 to 5 years (15%), least number of cases were reported in age group 46 to 60 years. Most of the isolates of *Acinetobacter spp.* were from patients admitted in Obstetrics & Gynaecology (28%) followed by Surgery wards (25%), Medicine wards (16%), ICU (includes all ICU's) (14%), Paediatrics (13%) and ENT (4%).Studies done by Garcia-Garmendia, J. L *et al.* [11] & Jean S.S. *et al.* [12] shows results similar to our study. This can be attributed to the fact that females of reproductive age are commonly admitted to hospital for child birth so they are more exposed to hospital environment. Present study shows female prepondence in the age group of 16 to 30 years. Majority of isolates of Acinetobacter spp. have been isolated from obstetrics & gynecology wards, which supports our findings.

Antibiotic susceptibility pattern of *Acinetobacter spp.* shows high resistance to Cefotaxime 89% followed by Amoxicillin-sulbactam 87%, Piperacillin–tazobactam 80%, Amikacin 79%, Imipenem 77%, Ciprofloxacin 70%, Cotrimoxazole 35%. The pattern of organism causing infection and their antibiotic susceptibility pattern vary widely from country to country as well as from hospital to hospital and even among ICU's & wards within one hospital. Analysis of variation in antibiogram even among wards & ICU's within same hospital is important as it will be helpful in knowing the local antibiotic resistance pattern, which will guide in formulation of effective antibiotic policy and implementation of antibiotic stewardship program which will result in rational use of antimicrobial agents.

Conclusion

Acinetobacter spp. isolation from various clinical samples has proved their existence in all sites leading to range of disease. Multidrug resistance exhibited by Acinetobacter spp. has become challenge in treating these infections. So judicious use of antibiotics by instituting antibiotic policy and following hospital infection control measures will help in effective management of patient care.

References

1. Mindolli PB, Salmani MP, Vishwanath G, Hanumanthapa AR. Identification and speciation of *Acinetobacter* and their antimicrobial susceptibility testing. Al Ameen J Med Sci. 2010; 3:34-59.
2. Kumar AV, Pillai Vs, Dinesh KR, Karim S. The Phenotypic detection of carbapenamase in Meropenem resistant *Acinetobacter calcoaceticus- baumanii complex* in a tertiary care hospital in south india.J.Clin Diagn Res. 2011; 5:223-6.
3. Manchanda V, Sanchaita S, Singh N. Multidrug resistant *Acinetobacter*. J.Glob Infect Dis. 2010; 2:291-04.
4. Fournier PE, Richet H. The epidemiology and control of *Acinetobacter baumanii* in health care facilities. Clin Infect Dis. 2006; 42:692-9.
5. Seifert H, Strate A, Pulverer G. Nosocomial bacteremia due to *Acinetobacter baumanii*. Clinical features, epidemiology, and predictors of mortality Medicine 1995; 74:340-9.
6. Mackie, Mc Cartney. Practical Medical Microbiology, 14th edition Kundli Press, Elsevier publishers, 2012, 113-150.

7. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Disks Susceptibility Tests; Approved Standard. 25th informational supplement CLSI document M100-S25. Wayne, PA: CLSI, 2015.
8. Chakravarti DN, Fiske MJ, Fletcher LD, Zagursky RJ. Application of genomics and proteomics for identification of bacterial gene products as potential vaccine candidates. Vaccine. 2000; 19:601-612.
9. Neetu Gupta, Nageshwari Gandham, Savita Jadhav, Ravindra Nath Mishra. Isolation and identification of Acinetobacter Species with special reference to antibiotic resistance. J Nat Sci Biol Med. 2015; 6(1):159-162.
10. Zeina A Kanafani, Nada Zahreddine, Ralph Tayyar, Jad Sfeir, George F Araj, Ghassan M Matar, *et al*. Multi drug resistant *Acinetobacter species:* a seven year experience from tertiary care center in Lebanon, 2018. doi:10.1186/s 13756-017-0297-6.
11. Garcia Garmendia JL, Ortiz Leyba C, Garnacho Montero J, Jimenez Jimenez FJ, Perez Paredes C, Barrero Almodovar AE, *et al.* Risk factors for *Acinetobacter baumannii* nosocomial bacteremia in critically ill patients: a cohort study. Clin. Infect. Dis. 2001; 33:939-946.
12. Jean SS, *et al.* Nationwide surveillance of antimicrobial resistance among non-fermentative Gram-negative bacteria in Intensive Care Units in Taiwan: SMART programme data 2005. International journal of antimicrobial agents. 2009; 33(3):266-271.