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Original Research Article

ISOLATION, IDENTIFICATION AND ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF ACINETOBACTER BAUMANNII FROM VARIOUS CLINICAL SPECIMENS RECEIVED AT A TERTIARY CARE HOSPITAL

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Abstract

Background: Acinetobacter species are responsible for a number of human diseases, including pneumonia (usually associated with endotracheal tubes or tracheostomies), endocarditis, meningitis, skin and wound infections, peritonitis in peritoneal dialysis patients, urinary tract infections, and bacteremia. This study was to isolate the Acinetobacter species from a variety of clinical samples using a streamlined phenotypic identification methodology and their antimicrobial susceptibility pattern by. **Materials and Methods:** This Cross sectional study was conducted in the Department of Microbiology,Government Medical college and Hospital ,Thiruvallur over a period of 6months from February 2024 to July 2024. Acinetobacter species were isolated from various clinical samples received in Department of Microbiology. After identification, Acinetobacter isolates were speciated and antibiotic susceptibility was determined by Kirby bauer disc diffusion method. **Result:** Of the total 4057samples, 1131(28%) were found to be culture positive. Out of total culture positive samples, 113 (9.9%) infections were found to be due to Acinetobacter. Acinetobacter species were predominantly isolated from urine samples 56 (49.5%) followed by pus 38(33.6%), respiratory samples 10(8.8%),blood samples 9 (7.9%) and ET aspirate 1 (0.8%). Acb complex was the most predominant and most resistant species. Acinetobacter species were more commonly isolated were from Intensive Care Units (ICUs) 34(30%). Antimicrobial susceptibility percentage for meropenem was 71(63%),amikacin 67(59.2%), piperacillin-tazobactum 66 (58%), cefepime 54 (48%), ceftazidime 47(42%), and ciprofloxacin 45(40%). Of 113 isolates, 27(23.8%) isolates were multidrug resistant. **Conclusion:** A high level of antibiotic resistance was observed in our study and maximum isolation rate of Acinetobacter was in the ICUs.The analysis of susceptibility pattern will be useful in understanding the epidemiology of this organism in our hospital setup, which will help in treating individual cases and controlling the spread of resistant isolates to other individuals.

INTRODUCTION

Acinetobacter species are common, saprophytic, and have become a significant nosocomial pathogen because of their capacity to survive on a variety of wet and dry surfaces in hospital settings.[1]
Acinetobacter species are responsible for a number of human diseases, including pneumonia (usually associated with endotracheal tubes or tracheostomies), endocarditis, meningitis, skin and wound infections, peritonitis in peritoneal dialysis patients, urinary tract infections, and bacteremia.[2]
Acinetobacter's antimicrobial susceptibility pattern might differ significantly across different regions and time periods within the same hospital. Because Acinetobacter resistograms vary, it is necessary to periodically monitor these bacteria in order to select the right medication.[3]

Understanding the institutional common susceptibility profiles is crucial since clinical strains of Acinetobacter exhibit unanticipated patterns of multidrug resistance. Therefore, the purpose of this study was to isolate the Acinetobacter species from a variety of clinical samples using a streamlined phenotypic identification methodology and their antimicrobial susceptibility pattern by Kirby bauer disc diffusion method.

MATERIALS AND METHODS

This Cross-sectional study was conducted in the Department of Microbiology, Government Medical college and Hospital, Thiruvallur over a period of 6months from February 2024 to July 2024. The study was approved by the Ethical Committee of our institution.

A total of 4463 clinical samples (pus, sputum, blood, urine, ET aspirate) received in the Department of Microbiology for culture and sensitivity from inpatients and outpatients during the period from February 2024 to July 2024 was included in the study. Samples were processed for culture by standard conventional methods. Genus Acinetobacter was identified by colony morphology, Gram staining, positive catalase test, negative oxidase test and absence of motility. Speciation of Acinetobacter was performed on the basis of glucose oxidation, beta hemolysis, growth at 42°C, and antimicrobial susceptibility testing was determined by Kirby Bauers disc diffusion method according to the Clinical and Laboratory Standards Institute guidelines.[4]

For Antimicrobial susceptibility testing, Piperacillin-Tazobactum (100 /10µg), ceftazidime (30 µg), cefepime (30 µg), ciprofloxacin (5 µg), meropenem (10 µg) amikacin (30 µg) antibiotic disc was used.[5]

RESULTS

Of the total 4057samples, 1131(28%) were found to be culture positive. Out of 1131 positive culture, Gram negative bacteria were 891 (79%). Of total Gram-negative organisms, 251 (28%) were non fermenters and the isolation rate of Acinetobacter from total non-fermenters was 113(45%). Out of total culture positive samples, 113 (9.9%) infections were found to be due to Acinetobacter.

Acinetobacter species were predominantly isolated from urine samples 56 (49.5%) followed by pus 38(33.6%), respiratory samples 10(8.8%), blood samples 9 (7.9%) and ET aspirate 1 (0.8%).

Acinetobacter species isolated were from Intensive Care Units (ICUs) 34(30%) followed by obstetrics and gynecology ward 24 (21.2%), medicine ward 16 (14.1%), orthopedics ward 12(10.6%), surgery ward 10(8.8%) pediatric ward 5 (4.4%), and out patients department 12 (10.6%).

In the present study, maximum isolated species were Acb (Acinetobacter calcoaceticus-A. baumannii) complex 94 [83.1%] of total Acinetobacter isolates), non-Acb complex (Acinetobacter lowffii 19(16.8%). There was a higher incidence of infection among males. Acinetobacter infection was more common in patients in age group >50 years 54 [47.7%] followed by 18-50years 48(42.4%) and in age <18 years it was 11 [9.7%%]. Infection in neonates was higher within 14 days postpartum.

The disc diffusion susceptibility testing shows the percentages of resistance and sensitivity among all isolates.

Antimicrobial susceptibility percentage for meropenem was 71(63%), amikacin 67(59.2%), piperacillin-tazobactum 66 (58%), cefepime 54 (48%), ceftazidime 47(42%), and ciprofloxacin 45(40%) of 113 isolates, 27(23.8%) isolates were multidrug resistant strains (isolates resistant to at least one agent in three or more antimicrobial categories-penicillins, cephalosporins, aminoglycosides, fluoroquinolones, and carbapenems).[6,7]

Table 1: Phenotypic characteristics of Acinetobacter species.

Name of the test	Acinetobacter baumannii	Acinetobacter lowffii
Gram staining	Gram Negative Cocco Bacilli	Gram Negative Cocco Bacilli
Catalase	+	+
Oxidase	-	-
Motility	Non motile	Non motile
Citrate	+	-
OF test	+	-
Nitrate reduction test	-	-
Hemolysis	-	-
Growth at 42c	+	-

DISCUSSION

Acinetobacter is a nosocomial pathogen.Infectious disease experts are concerned about it because of its capacity to infect healthy hosts and tendency to develop resistance to antimicrobial drugs.

In our study, Acinetobacter accounted for 45% of total nonfermenters and 9.9%of total positive cultures. Pseudomonas spp. was the most common nonfermenter isolated in our study which is concordant with a study by Gupta, et al.[1] In a study by Lone R et al and Magiorakos AP et al,[4] 12.9% and 4.8%,[6] of Acinetobacter isolates from total

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infected samples respectively. Acinetobacter was predominantly isolated from urine(21-27%) which is similar to our study findings.[7,8]

Bacteremia due to Acinetobacter occur most frequently in patients referred to intensive care units (ICUs) in particular because they typically need to stay longer in the hospital, require repeated invasive operations, and are often treated with broad range antibiotics.[9] In our study, maximum Acinetobacter isolates were from ICUs, which is consistent with a previous study by Seifert H et al.[10] It is also observed that the infection was common in patients of age group >50 years which is similar to a study by Mindolli et al,[11] Acinetobacter were in age group >45 years possibly due to weakened immune system and associated comorbidities in these age groups.

Antimicrobial resistance percentage was maximum for ciprofloxacin (60%), ceftazidime (58%), and cefepime (52%) which is similar to a study by Silva, R et al.[12]

In our study ,27(23.8%) isolates were multidrug resistant which is similar to a study by Shakibaie et al,[13] they found that many isolates of Acinetobacter species were resistant to almost all antibiotics routinely used in the ICUs of their hospital.

Acinetobacter seems to have a tendency to become resistant to antibiotics quite quickly, maybe as a result of its extensive evolutionary exposure to soil-dwelling microbes that produce antibiotics. The increased usage of antimicrobial drugs per patient and per surface area is the cause of the establishment of antibiotic-resistant bacteria in intensive care units.[14] However, these prevalence and sensitivity testing must be carried out on a regular basis as they will aid physicians in the better treatment of Acinetobacter infections.

CONCLUSION

Hospital environments have a high prevalence of Acinetobacter species among nonfermenters. The use of antibiotics must be justified in order to avert the catastrophic rise in resistance. To prevent the spread of Acinetobacter in hospitals, there should be constant awareness of the need to maintain proper housekeeping and environmental management, including decontaminating equipment and paying close attention to hand washing.

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