**ORIGINAL ARTICLE**

# Clinical Profile and Resistance Pattern in Acinetobacter Bacteremia in a Tertiary Care Centre

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## ABSTRACT:

**Introduction**: Acinetobacter causes deadly hospital acquired infections. This is study was planned to identify the clinical and resistance profile, outcome and mortality predictors of acinetobacter bacteremia in a tertiary care centre in north Kerala.

**Methods**: retrospective observational study. Data obtained from case records, microbiology culture reports and by interviewing primary care team of each patient

**Result**: A total of 90 cases positive blood culture reports were collected and required data obtained from 50. 27 cases were analyzed. Resistance was found to be respectively 92% to cephalosporin, 77% to ciprofloxacin and 41% to amikacin. 38% isolates were multidrug resistant. Acinetobacter bacteremia was mostly due to VAP, CLABSI, severe skin infections and neutropenic sepsis.

**Conclusion:** Acinetobacter bacteremia has an overall mortality rate of 44%, with 75% mortality in VAP presentation. 38% of acinetobacter isolates were multidrug resistant. Most of the patients had malignancies, Diabetes Mellitus or cirrhosis as risk factors.

**Keywords**: Acinetobacter, multidrug resistant gram negative, hospital acquired infection, ventilator associated pneumonia, surgical site infection

## INTRODUCTION

Acinetobacter is a gram negative aerobic non motile bacterium causing primarily hospital acquired infections [1]. It's a 'red alert' pathogen in hospital settings because of its diverse mechanisms of acquiring multidrug resistance [3]. The bacteria are seen in soil and water and can cause community acquired infections in tropical climates and related to wars and natural disasters[4]. Risk factors for hospital acquired infections include recent surgery, central vascular catheterization, mechanical ventilation, and treatment with third generation cephalosporin, or carbapenem antibiotics [2]. Cross infections by the hands of health care workers is a common source for hospital outbreaks. Due to the high mortality associated and the multi drug resistant nature of the organism it is important to limit the spread, colonization and infections by this pathogen in hospital settings; of paramount importance in this regard to analyze the demographic profile of the acinetobacter infections, presentations and the drug resistance profile by the organism. This study was planned after a pilot review conducted in the medical ICU in our institution in which it was found that the incidence of hospital acquired acinetobacter infection is increasing. Hence this study was planned as a part of a series of studies to collect information on the incidence of acinetobacter infections, the probable portals of entry, the overall mortality and the mortality in relations to specific portals of entry and also to design the antibiogram against acinetobacter in our institution which would further help in deciding the empirical antibiotics to initiate in suspected acinetobacter infections.

## OBJECTIVES

The objectives were to study the demographic and clinical profile of the patients who had blood culture positive acinetobacter infections, to study the resistance profile of Acinetobacter isolates and also to study the outcome and the mortality predictors of blood culture positive Acinetobacter infections in our institutions.

## METHODOLOGY

A Retrospective observational study was planned. Study was conducted in a 3000 bedded tertiary care centre in south India. All patients in who acinetobacter was isolated from blood culture over a period of one year from 2/1/2016 to 1/1/2017 were included

in this study Data obtained from case records after obtaining permission from hospital authorities and interviewing the doctors involved. Drug susceptibility data was obtained from blood culture reports. We collected basic demographic data, primary disease which lead to hospitalization, presence of underlying co-morbidities like diabetes mellitus, chronic liver disease, kidney disease, neutropenia etc, complications which occurred in the hospital, likely portal of entry of acinetobacter infection. Blood for cultures were collected under strict aseptic precautions, and cultures were done on standard blood culture broth. VAP, HAP and CABSI was diagnosed by clinical criteria

Blood is cultured in standard techniques. The isolation, identification, and speciation were done by the standard procedure.

Antimicrobial susceptibility testing was done by the standard disk diffusion method. MDR Acinetobacter is defined as those isolates resistant to more than three classes of antibiotics[5]. An isolate was said to be pan-resistant when it was resistant to all the commonly used antibiotics.

## RESULTS

Demographic profile

Out of 90 blood culture isolates collected 50 isolates were subjected to detailed case reviewing from case record analysis and interviewing of treated team of doctors. Out of the 50 cases analyzed 23 cases were discarded due to inadequate or conflicting data. Detailed from the rest 27 are presented below

Age ranged from 23 to 85 and the average age was 50. There were 13 male patients and 14 females. Most of the patients were admitted and treated at medicine departments (12 patients) and the rest were from surgery and other surgical specialties. 15 patients out of 27 survived, the mortality rate being 44%.

Drug Resistance Profile

90 blood culture isolates were subjected to drug resistance results over the period of one year from January 2016 to January 2017 (Table 1). 92% of the isolates were resistant to third generation cephalosporins. Out of which 50% became sensitive after adding sulbactum. 41% resistance to amikacin and 77% resistant to ciprofloxacin were also noted. Alarming feature was the 66% resistance to piperacillin tazobactum. BL+BLI combination (cefoperazone+ sulbactum) and colistin was the drug found most useful among the isolates.

Diagnosis of cases at the time of admission is categorized into table 2.

**Table 1 Acinetobacter – Hospital antibiogram**

| Drug name | Resistant isolates (Total varies from drug to drug) (%) |
|---|---|
| Cefixime | 87 (100) |
| Cefotaxime | 82 (92.1) |
| Cefoperazone+ sulbactum | 35 (39.8) |
| Ampicillin | 90 (98.9) |
| Ciprofloxacin | 70 (77.8) |
| Amikacin | 37 (41.6) |
| Gentamicin | 49 (56.3) |
| Piperacillin tazobactum | 43 (66.2) |
| Meropenem | 26 (63.4) |
| Imipenem | 7 (100) |
| MDR Acinetobacter | 34 (37.8) |

**Table 2 Admitting diagnosis category**

| Admitting diagnosis- category | Cases (%) |
|---|---|
| Skin and soft tissue infections | 8 (29) |
| Malignancy | 4 (15) |
| Chronic liver disease | 2 (8) |
| Surgical emergency | 6 (24) |
| Medical emergency | 6 (24) |

**Table 3 portal of entry leading to bacteremia**

| Portal of entry | Cases | Mortaity Rate |
|---|---|---|
| **CABSI** | 13 | 36% |
| **VAP & HAP** | 8 | 75% |
| **Severe skin infections** | 4 | 25% |
| **Neutropenic sepsis** | 2 | 100% |

Catheter associated bloodstream infections (CABSI) and Ventilator associated pneumonia (VAP) were the most common predisposing factors for the emergence of acinetobacter sepsis. Most of the patients also had co-morbidities like underlying malignancies (4), diabetes mellitus (2) or cirrhosis (3) as host factors .

Table 3 shows the likely portal of entry of acinetobacter into blood stream infections and the mortality rate in each condition. The best prognosis was found to be in patients with catheter associated blood stream infections, and the worst with pneumonia and neutropenic sepsis

## DISCUSSION

Our study shows that acinetobacter infections continues to be a major threat among hospital inpatients despite following adequate infection control practices in the hospital. Blood stream infections happen at various setting including a multitude of primary disease. Most of the isolates are resistant to standard antibiotics and combinations which are empirically given in hospital acquired infections. Death toll for

VAP and HAP preseentations amount to more than 75 %

Overall mortality of acinetobacter bacteremia is 44%. Which explains the significant addition to mortality and morbidity and cost of treatment by this hospital acquired pathogen. This is comparatively low against the overall mortality of acinetobacter bacteremia found in in Punjab in 2009 (70%)[5]

Acinetobacter infections are an emerging threat in hospital acquired infections. The affected patients are most often having severe diseases, on antibiotics, long hospital stays and are having multiple portals of entry like mechanical ventilation and central lines. The risk factors for acinetobacter infection as found in our study were increasing age, endotracheal intubation and mechanic ventilation, central lines, surgical procedures, burns, cirrhosis, diabetes mellitus and neutropenia.

The resistance to third generation cephalosporins, amikacin and ciprofloxacin are respectively 92%, 41%, 71%. The hospital antibiogram is of utmost importance to each hospital to suggest empirical antibiotics as well in their endeavour to reduce the antibiotic overuse and subsequent resistance development in the hospital. This also suggests the importance of restricting the usage of reserve antibiotics in each hospital across the country.

38% of acinetobacter isolates in our institution were found to be multidrug resistant. MDR acinetobacter was seen at a rate of 54.7 in a study conducted at Odisha in 2013[6]. The other studies conducted by Bhattacharyya *et al*. in West Bengal and Mostofi *et al*. in Tehran reported the MDR isolates to be 29% and 54%, respectively[7,8]. Piperacillin-tazobactum resistance of only 23% was noted by Dash et al[6] whereas 40% by Mostofi [7]. Third generation cephalosporins resistance was 93% and ciprofloxacin resistance 86% in Odisha[6]

In a report from 48 European hospitals from 2002 to 2004, 32.4%, 34% and 47.6% iso- lates showed susceptibility to Ceftazidime, Ciprofloxacin and Gentamicin respectively[9]. In Asia and the Middle- east, rates of non-susceptibility are about 40% for Ceftazidime, 35% for Amikacin and 45% for Ciprofloxacin[10].

The difference in resistance profile is due to various factors like hospital antibiotic and infection control policies, cost of drugs, period of study and community usage of the drug

Mortality relation to type of infection:

VAP: The most fatal acinetobacter infection in our institution is ventilator associated pneumonia and hospital acquired pneumonia. VAP carries a mortality rate of 75%. Compared to non-pneumonia presentation, VAP has odds ratio of 6 for mortality with a significant p value 0.04. Incidence of VAP in the ICU can be reduced by strict adherence to ventilator care bundles. VAP has an estimated overall mortality ranging from 33-50% [12] and 9-13 %[13] in various studies. Acinetobacter is estimated to cause 6% of all VAP[14]. VAP due to acinetobacter was found to have a mortality rate of 66.7 % in a tertiary care centre at Thailand [15]

CABSI: 50% of all acinetobacter blood stream infection in our institution could be attributed to central line assoicted, with a mortality rate of 36%. Parameswaran et al, have estimated that Acinetobacter to cause 4% of Catheter associated blood stream infection in ICU[16].

## CONCLUSION

Acinetobacter isolates were found to be resistant to 92% of cephalosporin, 77% of ciprofloxacin and 41% of amikacin. 38% isolates were multidrug resistant. Acinetobacter bacteremia was mostly due to VAP, central line associated blood stream infection, severe skin infections and neutropenic sepsis. Acinetobacter bacteremia was found to have an overall mortality rate of 44%, with highest mortality rate attributed to bacteremia due to ventilator associated pneumonia (75%).

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