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Research Article

CLINIC MICROBIOLOGICAL STUDY OF ACINETOBACTER SPECIES INFECTION IN A TERTIARY CARE HOSPITAL

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A R T I C L E I N F O

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A B S T R A C T

Objectives: To study the prevalence of *Acinetobacter* species infection, its antibiogram, and associated risk factors. **Methods:** Retrospective time-bound study for 6 months. The study includes 85 clinical isolates of *Acinetobacter* species isolated from various specimens. The identification and antibiotic susceptibility testing by Kirby Bauer Disk Diffusion method and Vitek Compact system 2. **Results:** Maximum isolation of *Acinetobacter* species was from Sputum (32.9%), BAL (21.1%), Urine (17.64%), Blood (11.7%), and others(16.47%).The species was most sensitive to colistin (97.64%) and polymyxin B (99.99%). The species was most resistant to Ciprofloxacin (96.4%) and Ceftriaxone (92.9%). The common risk factors include Immunosuppressed individuals, comorbid conditions, indiscriminate antibiotic usage, and prolonged ICU stays. **Conclusion:** *Acinetobacter* has emerged as a major hospital-acquired pathogen. Antibiotic resistance increased. The availability of an antibiogram against *A. baumannii* is important for effective treatment and minimizing the emergence of antibiotic resistance. So, Proper antibiotic stewardship is required to abbreviate antibiotic resistance.

INTRODUCTION

Acinetobacter baumannii (*A.baumannii*) is strictly aerobic, gram-negative bacilli or coccobacilli, short, stout, non-motile, and non-fermenting. They are ubiquitous saprophytes, recovered in nature and the hospital, and able to survive on moist surfaces, such as mechanical ventilation equipment, and on dry surfaces, such as human skin. These bacteria are also part of the normal oropharyngeal flora of healthy people and can proliferate to large numbers during hospitalization [1, 2].*A. baumannii* is the most commonly found species in human clinical specimens, followed by *A. lwoffii*, *A. haemolyticus* and *A. johnsonii*. *A. baumannii* is the most often responsible for causing community and hospital-acquired infections and is increasingly being reported as a significant pathogen causing sepsis, wound infections and pneumonia [3]. Antibiotic resistance and the ability of the organism to survive in the moist environment has contributed to the survival and spread of this the pathogen in hospital settings. Immunosuppressed individuals, comorbid conditions, indiscriminate antibiotic usage, and prolonged ICU stays are the common risk factors for *A. baumannii* infections [4]. Infections due to *A. baumannii* possesses a serious threat to the healthcare system as most of the strains are frequently resistant to commonly used antimicrobial agents including cephalosporins, aminoglycosides, fluoroquinolones, and carbapenems. One of the common causes of resistance is the prolonged and indiscriminate usage of broad-spectrum antibiotics as empirical therapy without culture and sensitivity support [5, 6].

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 resistant strains, there is a surge in the rates of carbapenem resistance. The use of polymyxin, colistin, and tigecycline is considered to treat the carbapenem-resistant strains. The knowledge of the prevalence and pattern of antimicrobial susceptibility pattern of *Acinetobacter* spp. is important. The study is undertaken to evaluate the risk factors and antimicrobial resistance in *Acinetobacter* spp.

Aim

Clinicomicrobiological study of *acinetobacter species infection in a tertiary care hospital.*

Objective

1. To study the prevalence of isolation of *Acinetobacter* species
2. To study the antibiotic susceptibility pattern of *Acinetobacter* spp. by Vitek 2 and Kirby Bauer method
3. To study the risk factors associated with *Acinetobacter* spp. infections.

METHODS

A retrospective, hospital record-based study was undertaken from

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January 2023 to July 2023 in the Microbiology division, Central laboratory at Sharda Hospital, UttarPradesh.
The isolates of *Acinetobacter* species obtained from various clinical Specimens including BAL, urine, and blood from both inpatients and outpatients 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). The study has been approved by the Institutional Ethics Committee.

RESULTS

During a period of 6 months, i.e., from Jan 2023 to July 2023, a total of 6521 clinical samples were received. Out of these samples, 1.3 % of *Acinetobacter* spp. were isolated. Out of 85 samples, 65 samples (76.4%) were from inpatients, and 20(23.6%) were from outpatients. The maximum isolation of *Acinetobacter* species was from Sputum (32.9%), BAL (21.1%), Urine (17.64%), Blood (11.7%), and others (16.47%). Out of 85 isolates, 79(92.9%) *A. baumannii* were isolated, 3(3.5%) were *Acinetobacter junii*, and 3(3.5%) were *Acinetobacter lwoffii.* The rate of isolation of *Acinetobacter* spp. was significant in inpatients and in the age group above ≥55 years, associated with comorbidities, and long hospital stay. *Acinetobacter* infection was seen more in Males 58 (68.23%) compared to females 27 (31.76%). The prevalence of isolation and Antibiogram of Acinetobacter spp. is shown in Tables 1 and 2 respectively.

Table 1 Prevalence of *Acinetobacter* spp. isolated from a different clinical specimen

Specimen	No. of isolates (%)
Sputum	28 (32.9%)
BAL	18 (21.1%)
Urine	15 (17.64%)
Blood	10 (11.7%)
Others	14 (16.47%)

Table 2 Antibiotic resistance pattern of *Acinetobacter spp.*

Antibiotics	Number of resistant isolates (%)
Amikacin	52 (61.1%)
Cefotaxime	54(63.5%)
Ceftazidime	52 (61.1%)
Ceftriaxone	79(92.9%)
Ciprofloxacin	82(96.4%)
Colistin	2(2.35%)
Polymyxin B	0(0)
Imipenem	25 (29.45%)
Meropenem	48 (56.4%)
Piperacillin/tazobactam	62(72.94%)
Tigecycline	8(9.4%)
Minocycline	29(34.1%)

DISCUSSION

A. baumannii is one of the common bacteria which often shows drug resistance and has been associated with high morbidity and mortality; therefore, antibiotic susceptibility pattern of this organism is of utmost importance to the clinicians and help them in better patient management as well as in maintaining antibiotic stewardship. The present study showed 1.4% prevalence of *Acinetobacter species* out of all pathogenic bacteria. Mostly this species is isolated in Sputum and BAL samples followed by Urine, Blood and other samples. The bacterium is mostly associated with lower respiratory tract infection in hospitalised patients following urinary tract infection and blood stream infections.
Previously published studies have reported prevalence of *A. baumannii* from 3-11% which was comparable with current research [8, 9, 10, and 11]. This study demonstrated highest prevalence of *A. baumannii* among patients with pneumonia which is in accordance with other studies [12, 13]. One study from Nigeria [14] has reported maximum strains from blood samples. In this study, 54% *Acinetobacter species* were isolated from the patients having lower respiratory tract infection which is in contrast with another study that documented 13% *A baumannii* in this group; and a study by Uwingabiye J *et al*. [10] has demonstrated very low prevalence (2%) of *A. baumannii*in these patients. We reported a prevalence of 11.7% and 17.64% of *Acinetobacter species* in blood stream infection and UTI patients respectively. Other published studies have also documented 3-14% isolation rate of *A. baumannii* from blood and 5-53% from urine which are comparable to this study [10, 12, 13].Overall, in our study Cephalosporins, Fluroquinolones and Aminoglycosides have showed less effectivity whereas Minocycline, Polymyxins, Imipenem and Tigecycline have showed good effectivity against *Acinetobacter species*. A study from Saudi Arabia [9] concluded that they have got best results while using carbapenems and polymyxins in ICU patients. Studies from Morocco [10] and Madhya Pradesh [12] have revealed high resistance in beta-lactam antibiotics and showed very less resistance in Colistin which correlates well this study results.

CONCLUSION

Acinetobacter has emerged as a major hospital acquired pathogen. Antibiotic resistance increased. Availability of antibiogram against *A. baumannii* is important for effective treatment and minimise the emergence of antibiotic resistance. So, Proper antibiotic stewardship is required to abbreviate antibiotic resistance.

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