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Research Article

CLINICOMICROBIOLOGICAL STUDY OF INFECTIONS CAUSED BY *ACINETOBACTER SPECIES*

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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

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INTRODUCTION

Acinetobacter baumannii, non-fermenting Gram-negative baciili 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. 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 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)
Ceftazidime	65 (87.83)
Ceftriaxone	112 (81.15)
Ciprofloxacin	138 (73.79)
Colistin	4 (2.12)
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%). The rate of isolation and Antibiogram of Acinetobacter spp. is shown in Tables 1 and 2 respectively.

DISCUSSION

Acinetobacter spp. is the second most common non-fermenting bacteria isolated from clinical specimen especially in hospital settings [8]. The recent years have seen the emergence of this pathogen in ICUs [7].

In our study, the rate of isolation of *Acinetobacter* spp. from different clinical specimens is 1.23%. This statistics is similar to the findings of the study by Dash *et al.* in Odisha (3%), Tripathi *et al.* in Madhya Pradesh (1.02%), and Vaja *et al.* in Gujarat (4.8%) [9,10,11]. The prevalence rate of this study is less compared to 14% and 9.6% rates among the hospital isolates reported by Mostofi *et al*. in Tehran, Iran, and Joshi *et al*. in Pune, India, respectively [12,13].

In this study, *Acinetobacter* spp. was isolated from various clinical specimens such as blood, urine, suction tip, sputum, among which suction tip (31.9%) was the most common. The results are different from study by Dash *et al*. in Odisha and Vaja *et al*. in Gujarat. They have reported maximum isolation from pus/swab (56%) and blood (50%) [9,11].

The major risk factors for *Acinetobacter* spp. infections were age ≥50 years, length of stay in hospital, invasive procedures like catheterization, intubation, and mechanical ventilation with underlying comorbid conditions such as diabetes mellitus, similar to the findings of the studies published earlier [9,14,15].

In this study, 59.16% of the *Acinetobacter* isolates found to be multi-drug-resistant (MDR) which is similar 54.7% in 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.

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