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# STUDY OF PREVALENCE AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF ACINETOBACTER SPECIES ISOLATED FROM VARIOUS CLINICAL SPECIMENS IN TERTIARY CARE INSTITUTE IN NORTH WEST REGION OF RAJASTHAN

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**ABSTRACT** **Acinetobacter species are the fast emerging agents of opportunistic and nosocomial infections with evolving drug resistance which have become a real problem in hospital setups,**

**m in hospital setups, particularly in critical care units. The study presented** ***in this paper was planned with this background to have a comprehensive approach to these infections. A total of 700 patients were studied in this study. A questionnaire was developed to assess risk factors associated with development of these infections and their antimicrobial susceptibility pattern. A proper assessment of these infections along with their anti resistance pattern that predispose to these infections and the prudent use of antibiotics may help in reduction of these infections.***

**KEYWORDS** :Acinetobacter species, risk factors, antimicrobial susceptibility pat

## INTRODUCTION

*Acinetobacter* species are Gram-negative, non-fermenting cocco bacilli causing mostly noso comial infections [1]. In recent years, several hospital wide outbreaks due to this organism have been reported [2]. Crude mortality rates of 30-75% have been reported for nosocomial pneumonia caused by Acinetobacter species [3].Acinetobacter species can cause a wide spectrum of clinical infections in the ICU, including pneumonia, meningitis, bacteremia, urinary tract infection, endocarditis, peritonitis and soft tissue infections [4,5]. Acinetobacter species are notorious for resistance to Beta lactum antibiotics. The spread of multidrug resistant Acinetobacter strains among hospitalized patients has become an increasing cause of concern [6]. Hence, it is important to look for novel classes of antibiotics which are effective in training infection due to Acinetobacter species.

### OBJECTIVES

Determining the prevalence of infections caused by Acinetobacter species, their risk factors and their antibiotic resistance pattern in the north western region of Rajasthan.

### MATERIAL & METHOD: STUDY AREA AND STUDY POPULATION

The prospective study was conducted in Department of Microbiology, Sardar Patel Medical College, Bikaner from May 2014 to Jan 2015 (9 months) to detect prevalence of nosocomial infections caused by Acinetobacter species in various clinical specimens such as blood, urine, pus, CSF, throat swab, vaginal swab, sputum, pleural fluid, bronchoalveolar lavage, bronchial aspirate samples etc.

**Inclusion Criteria** : All consecutive isolates of Acinetobacter species isolated from various specimens of patients after admission in different wards of the hospital for more than 48 hours.

**Data Collection :** A detailed history was taken using a questionnaire that included patients' demographic characteristics (age, gender), septicaemia, burn, malignancy, recent surgery (within 1 month), previous treatment with broad spectrum antibiotics, use of invasive devices and prolonged hospital (>1 week) or ICU stays [7,8].

**Exclusion Criteria** : Isolation of three organism types with no predominating organism and repeated isolate from same patient were excluded from this study.

**Microbiological Methods :**

All patient samples were collected and analyzed at Microbiology lab, Sardar Patel Medical College Bikaner, Rajasthan. The samples were processed for the identification of organisms by the conventional biological tests [9]. All isolates were cultured on Mac Conkey agar and blood agar and urinary isolates on Hichrome UTI media and finally incubated at 37° for 24 hours.

**Identification :**

The accurate identification of bacterial isolate was done by their characteristic appearance on the media, Gram's staining, Motility testing (by hanging drop method), and biochemical testing (Catalase, Indole, Methyl red, Citrate, Urease, Triple sugar iron, PPA, Oxidase test and Sugar fermentation test).Bacterial isolates obtained were identified as per standard microbiological identification. Antibiotics susceptibility of the incriminated organism was done by Kirby-Bauer disc diffusion method as per CLSI guidelines [10].

### RESULT

A total of 700 clinical specimens of all ages and both sexes were studied. In the study, we found that out of 700, 85 (12.14%) were positive for Acinetobacter infection, out of which 76 (89.41%) yielded Acinetobacter baumannii and only 9 (10.58%) Acine tobacter lwoffii. Acinetobacter species were recovered most frequently from blood (40%), urine (38%), sputum (8.23%), pus (5.88%), ear discharge (2.35%), throat swab (2.35%) and other samples (2.35%). Among 85 positive cases for Acinetobacter species, 52.94% belonged to age group >40 years and 47.06% belonged to age group <40 years with higher incidence in male (56.47%) as compared to female (43.52%).Distribution of other micro-organisms (Gram negative bacilli) isolated from various clinical samples are shown in Table 1.

| Type of micro-organisms | Total no. of isolated organisms | Percentage (%) |
|---|---|---|
| E.coli | 373 | 53.28 |
| Pseudomonas spp. | 124 | 17.71 |
| Klebsiella spp. | 101 | 14.42 |
| Proteus spp. | 17 | 2.4 |
| Total | 615 | 100 |

**Table 1 : Distribution of other micro organisms (Gram negative bacilli)**

Antimicrobial drug susceptibility pattern of the isolated Acinetobacter species in percentage(%) is shown in Table 2. The Acinetobacter isolated strains, A.baumannii were more susceptible to Colistin (96.06%), Imepenem (90.79%) and Meropenem (85.59%) and A.lwoffii were susceptible to Ciprofloxacin (100%), Imipenem (100%) and Colistin (100%).

| Name of drug | A. baumanni (76/85) | A.lwoffii (9/85) |
|---|---|---|

| | | |
|---|---|---|
| Amikacin(AK) | 34 (44.74%) | 7 (77.78%) |
| Ampicillin-sulbactam (AMS) | 55 (72.37%) | 8 (88.89%) |
| Ceftazidime (CAZ) | 16 (21.05%) | 7 (77.78%) |
| Ceftriazone (CTR) | 23 (30.27%) | 5 (55.56%) |
| Ciprofloxacin (CF) | 31 (40.79%) | 9 (100%) |
| Imipenem (IPM) | 69 (90.79%) | 9 (100%) |
| Meropenem (MR) | 65 (85.53%) | 8 (88.89%) |
| Colistin (CL) | 73 (96.06%) | 9 (100%) |
| | | |

**Table 2 : Antimicrobial drug susceptibility pattern of the isolated Acinetobacter species.**

**RISK FACTOR ANALYSIS**

Among the 85 positive cases, most isolates were recovered from the ICU stays (31.76%), followed by recent surgery (21.17%), use of invasive devices (16.47%), use of broad spectrum antibiotics (8.5%), urinary catheterization (9.4%), prolonged hospital stays (7.05%).

**DISCUSSION**

Acinetobacter species, fast emerging as agents of opportunistic and nosocomial infections with evolving drug resistance, have become a real problem in hospital setup particularly in critical care units. Acinetobacter species are mostly implicated in various nosocomial infections like bloodstream infections, urinary tract infections, respiratory tract infections, wound infections, meningitis and rarely in keratitis and other infections.Management of Acinetobacter infections is a huge challenge because of broad array of antimicrobial resistance and pathogen's ability to develop resistance rapidly. In the study, prevalence of Acinetobacter infections was 12.14%.Most of the isolated strains have belonged to the A.baumannii species (89.41%) because there was extremely rapid development of antimicrobial resistance, due to the wide spread use of antimicrobials in hospital environment and ability of A.baumannii to respond rapidly to challenges by antimicrobials.

## CONCLUSION

To conclude, a proper assessment of risk factors that predispose to Acinetobacter infections and proper assessment of their anti microbial resistance pattern may help in reduction of these infections. Awareness of the need to maintain good housekeeping and controlled environment, including equipment decontamination, strict attention to isolation procedures, prudent uses of antibiotics especially in highrisk areas appear to be combination of measures to control the unabated spread of Acinetobacter species in hospitals.

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