



Retrospective Analysis Of Antibiotic Resistance Trends In *Acinetobacter Baumannii* Isolates In Patients Of Intensive Care Units Of A Tertiary Care Hospital In Himachal Pradesh.

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Abstract: An opportunistic pathogen *Acinetobacter baumannii* pose a global threat to human health and a therapeutic challenge due to emerging and constantly increasing resistance. It has been designated as a “red alert” human pathogen and so require continuous surveillance and antibiotic stewardship. This study aims to provide the frequency of *Acinetobacter* in various clinical samples and their antimicrobial sensitivity pattern. A retrospective hospital-based study was conducted for a period of 12 months with effect from January 2022 to December 2022. A total of 117 *Acinetobacter* strains were isolated from 430 clinical specimens. Maximum samples were from NICU/PICU 44.4% followed by AICU 49% and CCU 6.5%. Our study showed that all the isolates of *Acinetobacter baumannii* were sensitive to colistin while high resistance was seen for ceftazidime (97.4%), followed by amikacin (95%), meropenem (91.5%).

INTRODUCTION

Acinetobacter baumannii is one of the ESKAPE organisms (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp.), that pose a global threat to human health and a therapeutic challenge due to emerging and constantly increasing resistance. Multidrug-resistant (MDR) pathogens has increasingly become a cause for serious concern with regard to both nosocomial and community-acquired infections.¹ Indeed, the World Health Organization (WHO) has recently identified antimicrobial resistance as one of the three most important problems facing human health.² Carbapenem resistant *Acinetobacter baumannii* (CRAB) was ranked in 2018 by WHO as number one priority for antibiotic research and development. Carbapenem was chosen as a marker, because carbapenem resistance is usually associated with a broad range of co-resistance to other antibiotic classes.³

An opportunistic pathogen *Acinetobacter baumannii* has a high incidence among immunocompromised individuals, particularly those who have experienced a prolonged (> 90 d) hospital stay.⁴ Commonly associated with aquatic environments.⁵ It has been shown to colonize the skin as well as being isolated in high numbers from the respiratory and oropharynx secretions of infected individuals.⁶ In recent years, it has

been designated as a “red alert” human pathogen, generating alarm among the medical fraternity, arising largely from its extensive antibiotic resistance spectrum.⁷

MATERIAL AND METHOD

Study design:

A retrospective hospital-based study was carried out in the Department of Microbiology at Dr. Rajendra Prasad Government Medical College, Kangra at Tanda (H.P.)

Study duration:

The study was conducted for a period of 12 months with effect from January 2022 to December 2022. Direct smear staining was performed for each sample and organisms were identified on the basis of morphology, arrangement and Gram’s reaction. The samples were inoculated on Blood agar and MacConkey agar plates. The plates were then incubated overnight at 37°C for 24 hours. The growth of the organisms was observed on blood agar medium and MacConkey agar medium. The colonies were identified from colony characters like size, shape, surface, edges, margin, consistency, emulsifiability, opacity, colour and any odour. Further growth was confirmed by Gram staining, biochemical reactions and other specific confirmatory tests. Antimicrobial susceptibility testing was performed on Mueller Hinton Agar (MHA) by Kirby Bauer disc diffusion method as per CLSI guidelines.⁸

RESULT

A total of 117 *Acinetobacter* strains were isolated from 430 clinical specimens. Fifty eight percent of them were from males and 58% of them were from females. (Table 1)

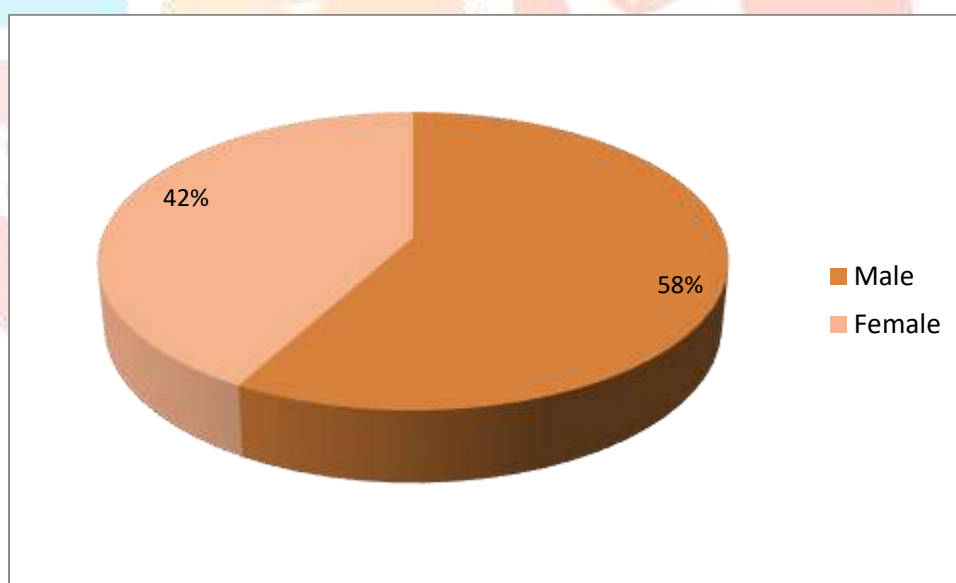


Table 1: Sex-wise distribution of samples

The age wise distribution showed that maximum samples were from 0-18 year’s age group (49.5%), followed by 19-60 years (32.4%) and more than 60 years (18.1%). Majority of samples were endotracheal aspirate (55.4%), followed by pus (29.5%), central tip (8.3%), cerebrospinal fluid (5.5%) and sputum (1.3%). Table 2

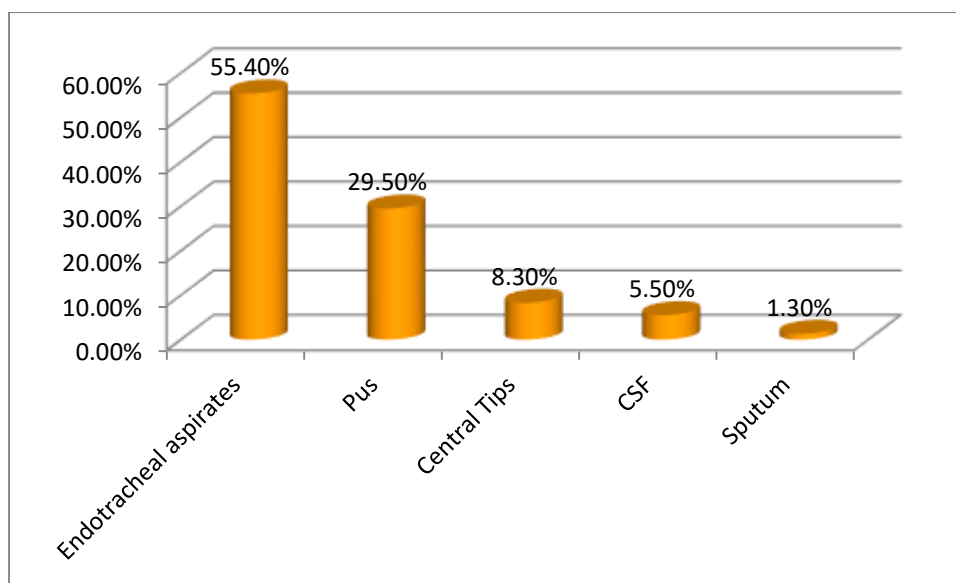


Table 2: Distribution of *Acinetobacter* strains in relation to source of specimens

Maximum samples were from NICU/PICU 44.4% followed by AICU 49% and CCU 6.5%. Our study showed that all the isolates of *Acinetobacter baumannii* were sensitive to colistin while high resistance was seen for ceftazidime (97.4%), followed by amikacin (95%), meropenem (91.5%), piperacillin/ tazobactam (89.7%) ampicillin- sulbactam (84%), doxycycline (68%) and levofloxacin (66%). Table 3

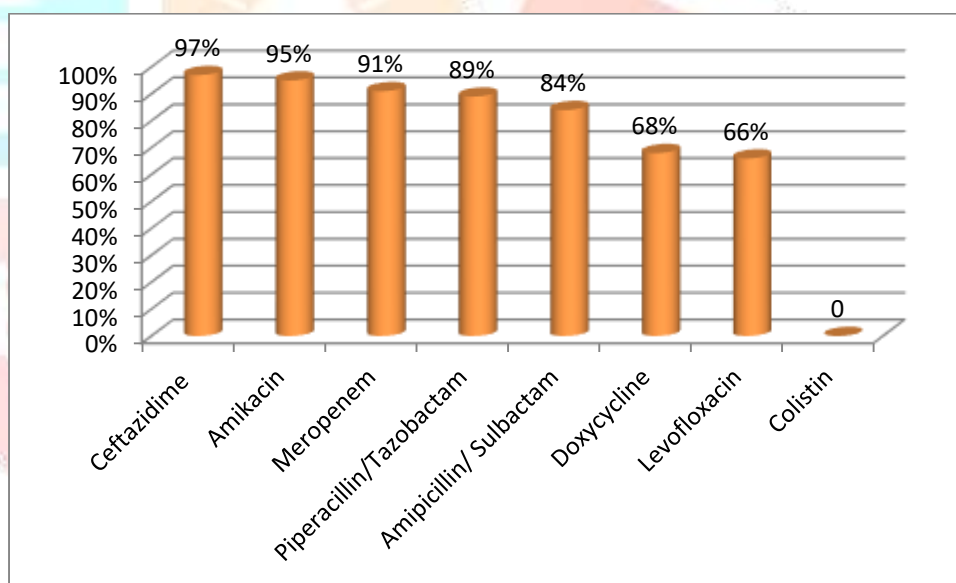


Table 3: Antimicrobial resistance pattern of *Acinetobacter* strains among various clinical isolates.

In our study, multidrug resistant *Acinetobacter baumannii* (72%) isolates were obtained, resistant to ≥ 3 antimicrobial classes.

DISCUSSION

Multidrug-resistant *Acinetobacter baumannii* is a rapidly emerging pathogen in the health care setting, where it causes infections that include bacteraemia, pneumonia, meningitis, urinary tract infection, and wound infection.⁹ The organism's ability to survive under a wide range of environmental conditions and to persist for extended periods of time on surfaces make it a frequent cause of outbreaks of infection and an endemic, health care-associated pathogen.¹⁰

Endotracheal aspirate samples constitute the majority, showing substantial resistance, suggesting a significant impact on respiratory infections in the hospital setting and emphasizing the need for targeted empirical therapy in these cases. Pus samples demonstrate notable resistance patterns, emphasizing the challenge in treating soft tissue infections caused by *Acinetobacter baumannii*.

The high antibiotic resistance observed in *Acinetobacter baumannii* is a global concern. Continuous surveillance, antibiotic stewardship, and research efforts are essential to mitigate the impact of *Acinetobacter baumannii* infections on patient outcomes and public health.

CONCLUSION

The study underscores the criticality of surveillance and effective infection control measures to curb the rising trend of antibiotic resistance in *Acinetobacter baumannii*, emphasizing the need for novel therapeutic approaches.

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