International Journal of Science and Healthcare Research
[Indexed, Peer-Reviewed Journal]
Vol. 11; Issue: 1; Jan.-March 2026
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Clinical Scenario and Drug Resistance Patterns of *Acinetobacter baumannii* Isolates in Patients Attending a Tertiary Care Hospital

Angana Mahanta[1], Prativa Sahu[2], Angshurekha Das[3], Uttara Borkotoki[3]

[1]Department of Microbiology, Fakhruddin Ali Ahmed Medical College & Hospital, Assam
[2]Department of Microbiology, Tezpur Medical College & Hospital, Assam
[3]Department of Microbiology, Jorhat Medical College & Hospital, Assam

Corresponding Author: Dr Angana Mahanta

DOI: https://doi.org/10.52403/ijshr.20260115

ABSTRACT

INTRODUCTION: *Acinetobacter baumannii* has been termed as an emerging pathogen which is involved in nosocomial infections mostly seen in Intensive Care Units (ICU). It has the ability to develop resistance to antibiotics which makes it difficult to treat.

OBJECTIVES: To calculate the burden of *Acinetobacter baumannii* isolates from different clinical samples and also to determine drug resistance patterns

METHODOLOGY: Clinical samples from January 2023 to December 2023 were processed and *Acinetobacter baumannii* isolates were identified by their colony morphology and biochemical reactions. The drug resistance patterns of these isolates were detected using different approved antibiotics by Kirby-Bauer disc diffusion test as per the CLSI guidelines.

RESULTS: 1418 samples were culture positive for Gram negative bacteria out of which 296 (20.87%) constituted of Acinetobacter isolates. Of these, 252 (85.14%) belonged to ICU patients. Rest 44 (14.86%) non-ICU cases were from gynaecology, surgery and otorhinolaryngology wards.

The antibiotic susceptibility testing of the Acinetobacter isolates showed multidrug resistant patterns with resistance to 3rd & 4th generation cephalosporins, quinolones, penicillin, carbapenems, aminoglycosides, macrolides.

CONCLUSION: *Acinetobacter baumannii* is a significant pathogen in ICU patients with multidrug isolates increasing progressively due to indiscriminate use of antibiotics. This stresses upon the rational use of antibiotics and strict infection control practices as the need of the hour to control its progress.

Keywords: Multidrug resistant *Acinetobacter baumannii*, Antibiotic susceptibility, ICU

INTRODUCTION

Acinetobacter baumannii is an aerobic, nonfermentative, non-motile, Gram-negative bacteria that infects patients preferably with diminished levels of immunity like ICU patients and those bearing invasive devices.

Multidrug-resistant *Acinetobacter baumannii* is an emerging hospital-and community-acquired infection.[1] It has been identified as one of the six ‘‘ESKAPE’’ (*Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa,* and *Enterobacter species*) pathogens responsible for

nosocomial infections and is regarded as a difficult organism to treat.[2]

Acinetobacter baumannii is abundantly found in the external environment and colonizes apparently healthy humans transiently on both external and internal body parts without causing infection. In the hospital environment, *Acinetobacter baumannii* can most commonly colonize the urinary, respiratory, gastrointestinal tract and can cause infections in cases of mechanically ventilated and immunocompromised patients.[3]

Treatment of *Acinetobacter baumannii* related infections is highly reliant on appropriate antimicrobial therapy. Carbapenems are the first-line treatment used in highly susceptible organisms and are usually considered as the drug of choice. Unfortunately, *Acinetobacter baumannii*, which is intrinsically resistant to some beta-lactam antibiotics can acquire resistance to other drugs as well making it multidrug resistant.[4]

AIMS & OBJECTIVES:

1. To calculate the rate of isolation *Acinetobacter baumannii* species from various clinical samples
2. To determine drug resistance patterns of isolated *Acinetobacter baumannii*

MATERIALS & METHODS

A laboratory based cross-sectional study was conducted from 01 January, 2023 to 31 December, 2023 in the Department of Microbiology in Jorhat Medical College & Hospital, Jorhat, Assam catering to the healthcare needs of the population of Jorhat which includes various tea-estates as well as neighbouring districts. Assam is a state belonging to the north-eastern region of India covering an area of 78,438 km^2. The total population of Assam was recorded to be 35,205,576 as per 2011 census. [5]

Inclusion criteria: *Acinetobacter baumannii* isolated from all clinical samples received in the laboratory were included in the study.

Exclusion criteria: Samples which yielded other organisms other than *Acinetobacter baumannii* were not included in the study.

Samples received in the laboratory were subjected to conventional methods of identification alongwith automated VITEK 2 Compact system. Specimens were cultured using appropriate solid media (5% sheep blood agar and MacConkey's agar) and the isolates were identified by their colony morphology and biochemical reactions. The drug resistance patterns of these isolates were identified using different antibiotics by Kirby-Bauer disc diffusion method as per CLSI guidelines, 2023 and also VITEK 2 automated system (Biomérieux).[6]

RESULT

During the 1-year study period, 1418 samples were culture positive for Gram negative bacteria out of which 296 (20.87%) constituted of Acinetobacter isolates. Of these, 252 (85.14%) belonged to ICU patients. Rest 44 (14.86%) non-ICU cases were from gynaecology, surgery and otorhinolaryngology wards. (Figure 1)

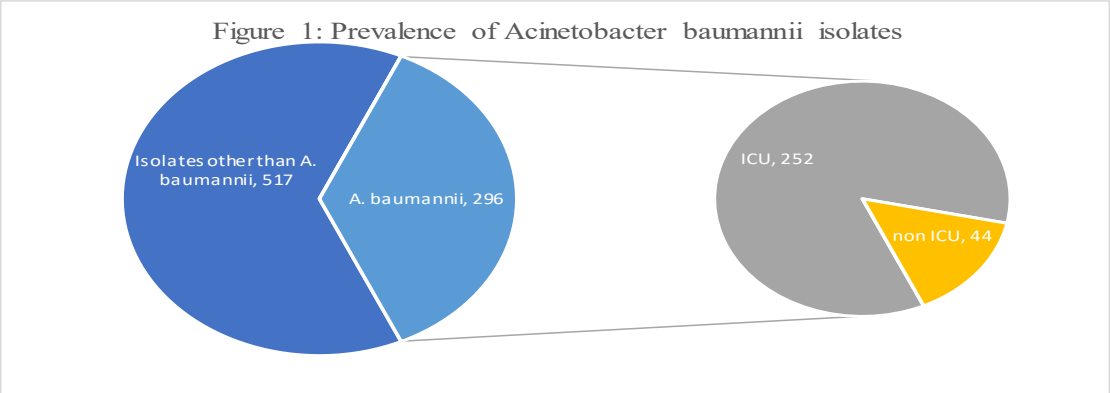

FIGURE 1: Prevalence of Acinetobacter baumannii isolates

Maximum isolates were from endotracheal tube aspirates 144 (48.64%), followed by blood 67 (22.63%), pus 43 (14.52%), sputum 21 (7.09%), urine 16 (5.40%), tracheal aspirate 4 (1.35%) and cerebrospinal fluid 1 (0.33%). (Table 1)

TABLE 1: Sources of Acinetobacter baumannii isolates

SAMPLE	NUMBER	PERCENTAGE
Endotracheal tube aspirate	144	48.64%
Blood	67	22.63%
Pus	43	14.52%
Sputum	21	7.09%
Urine	16	5.40%
Tracheal aspirate	4	1.35%
Cerebrospinal fluid	1	0.33%

68.9% cases belong to the age group 0-1 year. The prevalence was higher in males (57.9%) than in females (42.09%). (Figure 2)

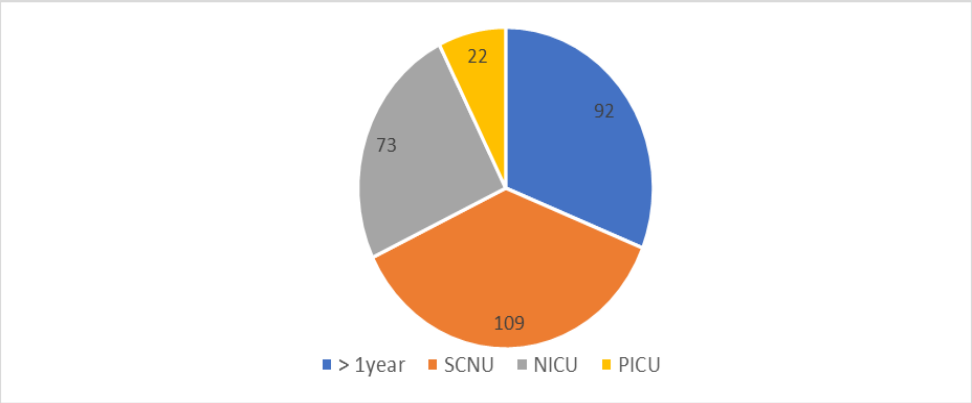

FIGURE 2: Age-wise distribution of isolated strains

The antibiotic susceptibility testing of the *Acinetobacter baumannii* isolates showed multidrug resistant patterns with resistance to 3rd & 4th generation cephalosporins, quinolones, penicillin, carbapenems, aminoglycosides, macrolides. In 20.27% of cases, doxycycline was found to be sensitive, followed by cotrimoxazole in 16.55% of cases, ciprofloxacin in 7.77%, of cases and azithromycin in 4.34% of cases. The isolates showed 100% sensitivity towards colistin. (Figure 3)

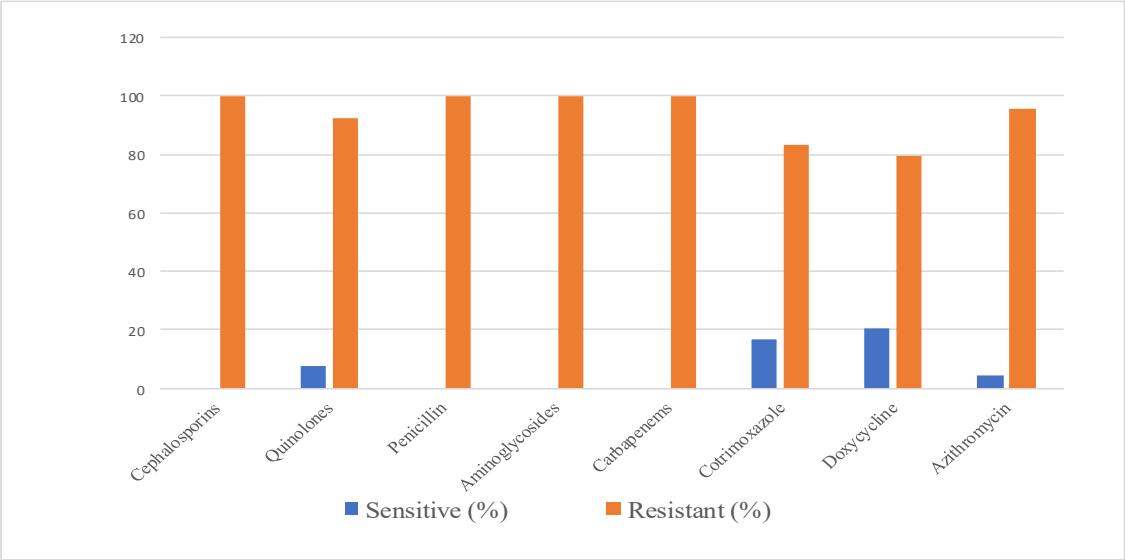

FIGURE 3: Drug sensitivity patterns of Acinetobacter baumannii isolates

DISCUSSION

Multidrug resistance is defined as resistance to at least one antimicrobial agent in three or more antimicrobial categories as per CLSI. Reports acquired globally indicate that *Acinetobacter baumannii* is the only Gram-negative bacilli to have increased significantly in ICUs in the last decade.[7] High prevalence of *Acinetobacter baumannii* has also been reported from other Asian countries [8] as well as India where *Acinetobacter baumannii* was the commonest isolate in the ICU from device associated infections. [9,10,11] In this study, 20.87% of total Gram-negative organisms in 2023, constituted of *Acinetobacter* isolates. Of this, 85.14% belonged to ICU patients. This corroborates with other studies conducted in India.[12]

The major site of *A. baumannii* isolation in this study was from the respiratory tract. Most isolates were from endotracheal tube aspirates (48.64%) out of which majority patients (72.63%) belonged to < 1 year of age. This is in accordance with other studies conducted in India. [13-15] In studies conducted in Odisha and West Bengal, highest isolates were obtained from pus and in Pune highest isolates were from urine. [16-18]

Also, it is seen that there is high level of multidrug resistance among the isolates except for colistin which shows 100% susceptibility and hence is currently the antimicrobial suggested for use. This is in accordance with studies from India and other countries in the world, which also reported a high resistance rate of *A. baumannii* isolates.[3,19,20] Additionally, Jaggi *et al*. in 2013 reported around 1.2% resistance and Rani *et al*. in 2015 reported 10% resistance to Colistin.[3,13] Correspondingly, Vakili *et al*. from Iran in 2014 reported an 11.6% resistance to colistin.[14] In 20.27% of cases, doxycycline was found to be sensitive, followed by cotrimoxazole in 16.55% of cases, ciprofloxacin in 7.77%, of cases and azithromycin in 4.34% of cases.

Study Limitations

A major limitation of this study is the lack of molecular processing (genotyping and sequencing) and determination of MIC values. Disc diffusion method might show technical errors. Another limitation is the inability to differentiate between active infection and colonization of the isolated strains as the epidemiological significance of the drug-resistance patterns might have been missed.

CONCLUSION

Multidrug-resistant *Acinetobacter baumannii* is seen to have become a major pathogen among ICU patients in the recent years due to injudicious practice of antibiotics. Rational therapeutic policies and strict infection control practices are needed to control its progress. This can be achieved by detecting its presence in a hospital setting at an early stage thereby preventing the establishment of endemic strains in the future.

Declaration by Authors

Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Shields RK, Clancy CJ, Gillis LM *et al.* Epidemiology, Clinical Characteristics and Outcomes of Extensively Drug-Resistant Acinetobacter baumannii Infections among Solid Organ Transplant Recipients 2012; 7(12): 1-10.
2. Begum S, Hasan F, Hussain S *et al.* Prevalence of multi drug resistant Acinetobacter baumannii in the clinical samples from Tertiary Care Hospital in Islamabad, Pakistan. Pak J Med Sci 2013; 29(5): 1253-8.
3. Jaggi N, Sissodia P, Sharma L. Acinetobacter baumannii isolates in a tertiary care hospital: Antimicrobial resistance and clinical significance. Journal of Microbiology and Infectious diseases 2012; 2(2): 57-63.
4. Sukanya S, Lakshmi V, Padmaja K. Prevalence of multidrug-resistant Acinetobacter baumannii in a critical care

setting: A tertiary teaching hospital experience. Int J Infect Control 2014; 11(13): 1-5.
5. IndiaCensus.Net [Internet]. Available at URL: https://www.indiacensus.net/
6. CLSI. M100 Performance Standards for Antimicrobial Susceptibility Testing, 33rd edition.
7. Gaynes R, Edwards JR. National Nosocomial Infections Surveillance System. Overview of nosocomial infections caused by gram-negative bacilli. Clin Infect Dis 2005; 41(6): 848-54.
8. Parajuli NP, Acharya SP, Mishra SK *et al*. High burden of antimicrobial resistance among gram negative bacteria causing healthcare associated infections in a critical care unit of Nepal. Antimicrob Resist Infect Control 2017; 6: 67-76.
9. Kumar S, Sen P, Gaind R *et al*. "Prospective surveillance of device-associated health care–associated infection in an intensive care unit of a tertiary care hospital in New Delhi, India," American Journal of Infection Control 2017; 46: 202–6.
10. Mostofi S, Mirnejad R, Masjedian F. Multi-drug resistance in Acinetobacter baumannii strains isolated from clinical specimens from three hospitals in Tehran-Iran. Afr J Microbiol Res 2011; 5: 3579-82.
11. Joshi SG, Litake GM, Satpute MG *et al*. Clinical and demographic features of infection caused by Acinetobacter species. Indian J Med Sci 2006; 60: 351-60.
12. Banerjee T, Mishra A, Das A *et al*. High Prevalence and Endemicity of Multidrug-Resistant *Acinetobacter* spp. in Intensive Care Unit of a Tertiary Care Hospital, Varanasi, India. J Pathog 2018; 1-8.
13. Gautam D, Dolma KG, Khandelwal B *et al*. Acinetobacter baumannii in suspected bacterial infections: Association between multidrug resistance, virulence genes, & biofilm production. *The Indian journal of medical research* 2023; 158(4): 439-46.
14. Mushtaq S, Javeid I, Hassan M. Antibiotic sensitivity pattern of *Acinetobacter* species isolated from clinical specimens in a tertiary care hospital. Biomedica 2013; 29: 23–6.
15. Alkasaby NM, El Sayed Zaki M. Molecular study of *Acinetobacter baumannii* isolates for metallo-β-lactamases and extended-spectrum-β-lactamases genes in intensive care unit, Mansoura university hospital, Egypt. Int J Microbiol 2017: 1-6.
16. Dash M, Padhi S, Pattnaik S *et al*. Frequency, risk factors, and antibiogram of Acinetobacter species isolated from various clinical samples in a tertiary care hospital in Odisha, India. Avicenna J Med 2013; 3: 97-102.
17. Chakraborty B, Banerjee D, Chakraborty B. Acinetobacter baumannii: No more a choosy intruder? Indian J Med Sci 2011; 65: 344-8.
18. Lone R, Shah A, Kadri SM *et al*. Nosocomial Multi-Drug-Resistant Acinetobacter Infections – Clinical Findings, Risk Factors and Demographic Characteristics. Bangladesh J Med Microbiol 2009; 3: 34-8.
19. Van TD, Dinh QD, Vu PD *et al.* Antibiotic susceptibility and molecular epidemiology of *Acinetobacter calcoaceticus–baumannii* complex strains isolated from a referral hospital in northern Vietnam. J Glob Antimicrob Resist 2014; 2(4): 318–21.
20. Gaur A, Garg A, Prakash P *et al*. Observations on carbapenem resistance by minimum inhibitory concentration in nosocomial isolates of *Acinetobacter* species: an experience at a tertiary care hospital in North India. J Health Popul Nutr 2008; 26(2): 183–8.

How to cite this article: Angana Mahanta, Prativa Sahu, Angshurekha Das, Uttara Borkotoki. Clinical scenario and drug resistance patterns of *Acinetobacter baumannii* isolates in patients attending a tertiary care hospital. *Int. J. Sci. Healthc. Res.* 2026; 11(1): 133-137. DOI: *https://doi.org/10.52403/ijshr.20260115*

******