



## ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF ACINETOBACTER SPECIES AT TERTIARY CARE HOSPITAL IN CENTRAL INDIA

### Microbiology

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### ABSTRACT

**Introduction :-** Acinetobacter species have become the most common etiology of hospital acquired infections due to the present frequent use of wide spectrum antibiotics. 1 Infections due to resistant Acinetobacter baumannii isolates cause difficulties in treatment.

**Objective :-** current study was to determine the susceptibility rate of different Acinetobacter species, isolated from various clinical samples of patients.

**Methods :-** 43 strains of Acinetobacter species were isolated from different clinical specimens and fully characterized by standard procedures with Antimicrobial susceptibility patterns as per guidelines of CLSI.

**Results:** Majority of isolates of Acinetobacter species 22 (51.16%) were obtained from specimens of pus. The isolated pathogens showed 100% sensitive to Polymyxin-B and Colistin.

**Conclusion:** The present studied showed that aminoglycoside, quinolone and carbapenem resistant Acinetobacter species is increasing gradually.

### KEYWORDS

Acinetobacter, sensitivity, carbapenem.

### INTRODUCTION

Nosocomial infections cause prolonged duration of hospitalization and increased treatment costs with high morbidity and mortality. Acinetobacter species have become the most common etiology of hospital acquired infections due to the present frequent use of wide spectrum antibiotics.<sup>1</sup> Infections due to resistant Acinetobacter baumannii isolates cause difficulties in treatment. Resistance due to drying and to nearly all commonly used antimicrobial agents are the key factors that enable these organisms to survive and spread in nosocomial environments.<sup>2</sup> Acinetobacter species are opportunistic pathogens predominantly found in immunocompromised patients. Infections caused by Acinetobacter species are acquired due to hospitalization, mechanical ventilation, respiratory failure, inadequate treatment, previous infection, or antibiotic therapy and catheterization.<sup>3</sup> Acinetobacter species are becoming increasingly resistant to nearly all routinely prescribed antimicrobial agents, including aminoglycosides, fluoroquinolones, and broad-spectrum  $\beta$ -lactams. The majority of strains are resistant to cephalosporin class of antimicrobials, whereas the resistance to carbapenems is increasingly reported.<sup>4</sup> So current study was to determine the susceptibility rate of different Acinetobacter species, isolated from various clinical samples of patients.

### METHODS

The present prospective cross-sectional study was conducted in the Department of Microbiology, Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha, for the period of thirteen months. All the patients admitted in the ICU, medical wards and surgery wards with various infectious with Acinetobacter species as isolates were included in the study. The samples like pus swab, wound swab, blood sample, sputum, endotracheal secretion, ascitic fluid, pleural fluid, cerebrospinal fluid, urine and catheter tip were collected. Total no. of 43 isolates from various patients was included in the present study. All collected samples were inoculated on routine culture media like Nutrient agar, MacConkey's agar and blood agar. Also used Herellea agar for identification of Acinetobacter species where the smooth and lavender colour colonies appear.<sup>5</sup> A battery of tests were performed that included Gram's staining, colony morphology, motility tests, sugar fermentation tests and biochemical tests such as oxidase test, urease and Phenyl puruvic acid test and IMViC (indole, methyl red, Voges-Proskauer and citrate) tests, Hugh-Leifson oxidative-fermentative media with added glucose, lactose, maltose and xylose for oxidation and fermentation Lysine and Ornithine decarboxylase and Arginine dihydrolase for the identification of Acinetobacter species.

**Susceptibility test:** Acinetobacter species strains were subjected to antimicrobial susceptibility test by modified Kirby-Bauer disk diffusion method as per CLSI guidelines. A panel of antimicrobials of standard strengths as follows: Amikacin 30  $\mu$ g/disc, Co-trimoxazole (25 $\mu$ g/disc), Ciprofloxacin 5  $\mu$ g/disc, Cefotaxime 30  $\mu$ g/disc, Colistin 10 $\mu$ g/disc, Piperacillin-tazobactam 100/10  $\mu$ g/disc, Tetracycline

30 $\mu$ g/disc, Imipenem 10 mcg, Polymyxin-B 300 units/disc (Hi Media Laboratories Pvt. Ltd., Mumbai, India). Escherichia coli (ATCC 25922) and Pseudomonas aeruginosa ATCC 27853 was used as control strain.

### Results

Amongst 43 samples collected the isolated Acinetobacter species were as follows as shown in Table no 1.

**Table no. 1 Showing Acinetobacter species (n=43)**

S.No.	Isolated Organism	No. of Isolates (n=43)
1	Acinetobacter baumannii	34 (79.07%)
3	Acinetobacter lwoffii	06 (13.95%)
4	Acinetobacter pittii	02 (4.65%)
5	Acinetobacter nosocomialis	01 (2.33%)
Total (n=43)		43 (100%)

Amongst 43 samples most common Acinetobacter baumannii were isolated in 34 samples (79.07%). Acinetobacter lwoffii were isolated in 06 samples (13.95%). Acinetobacter pittii were isolated in 02 samples (4.65%). Acinetobacter nosocomialis were isolated in 01 sample (2.33%). Hence it was observed that Acinetobacter baumannii maximum isolated in 34 samples (79.07%).

Acinetobacter species isolated from various specimens (n=43)

**Table no.2 Showing Isolated Acinetobacter species from various specimens (n=43)**

S.No	Isolated Organisms	No. of Isolates	Samples				
			Pus	Sputum	Urine	Wound swab	Blood
1	Acinetobacter baumannii	34 (79.07%)	17 (77.27%)	07 (87.50%)	06 (85.71%)	01 (50.00%)	03 (75.00%)
2	Acinetobacter lwoffii	06 (13.95%)	02 (9.09%)	01 (12.5%)	01 (14.29%)	01 (50.00%)	01 (25.00%)
3	Acinetobacter pittii	02 (4.65%)	02 (9.09%)	-	-	-	-
4	Acinetobacter nosocomialis	01 (2.33%)	01 (4.55%)	-	-	-	-
Total (n=43)		43 (100%)	22 (51.16%)	08 (18.61%)	07 (16.28%)	02 (4.65%)	04 (9.30%)

In all 43 samples Acinetobacter baumannii were most commonly isolated organisms in pus 17 samples (77.27%) and least common in wound swab 01 sample (50.00%). Acinetobacter lwoffii were isolated organisms in pus 02 samples (9.09%) followed by sputum (12.5%), urine (14.29%), wound swab (50.00%) and blood (25.00%).

*Acinetobacter pittii* isolated organisms in pus 02 samples (9.09%). *Acinetobacter nosocomialis* were isolated organisms in pus 01 sample (4.55%). Hence it was observed that maximum no. of organisms were

isolated in pus *Acinetobacter baumannii* 17 samples (77.27%) and least in *Acinetobacter nosocomialis* 01 samples (4.55%).

**Table 03 :- Antibiotic Sensitivity profile of isolated *Acinetobacter* Species from various specimens (n=43)**

Antibiotics	Amikacin	Ciprofloxacin	Co-trimoxazole	Ceftazidime	Imipenam	Piperacillin/Tazobactam	Tetracycline	Polymyxin B	Colistin
<b>Organism</b>									
<i>Acinetobacter baumannii</i>	52.94%	11.76%	8.82%	5.88%	70.59%	23.53%	17.15%	100%	100%
<i>Acinetobacter lwoffii</i>	50.00%	0.00%	0.00%	30.33%	83.33%	33.33%	16.66%	100%	100%
<i>Acinetobacter pittii</i>	50.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	100%	100%
<i>Acinetobacter nosocomialis</i>	50.00%	0.00%	0.00%	0.00%	100%	0.00%	0.00%	100%	100%

## DISCUSSION

In this study, a total of 43 isolates of *Acinetobacter* species were isolated and identified from various clinical sources, from the hospitalized patients and their antimicrobial susceptibility patterns were determined. In present studied *Acinetobacter baumannii* were isolated in 34 samples (79.07%) is comparable with Sohail *et al.*<sup>6</sup> which reported in *Acinetobacter* 519 (72.00%) out of 716 samples. *Acinetobacter lwoffii* were isolated in 06 samples (13.9%). *Acinetobacter pittii* isolated organisms in pus 02 samples (9.09%). *Acinetobacter nosocomialis* were isolated organisms in pus 01 sample (4.55%)

*Acinetobacter baumannii* were maximum sensitive to polymyxin-B and colistin (100%) followed by imipenam (70.59%) and amikacin (52.94%) and least sensitive to co-trimoxazole (8.82%) followed by ceftazidime (5.88%). It is comparable with Malini *et al* (2009)<sup>7</sup> reported *Acinetobacter baumannii* was 100% sensitive to imipenam, 53.5% sensitive to amikacin, 20% sensitive to cotrimoxazole and 26% sensitive to ceftazidime. Bose *et al* (2013)<sup>8</sup> reported *Acinetobacter baumannii* was 100% sensitive to polymyxin-B, colistin, 60.86% sensitive to imipenam, 26.06% sensitive to amikacin, and 30.25% sensitive to ciprofloxacin.

*Acinetobacter lwoffii* were maximum sensitive to polymyxin-B and colistin respectively (100%) followed by imipenam (83.33%) and amikacin (50%). It is comparable with Malini *et al* (2009)<sup>7</sup> reported *Acinetobacter lwoffii* was 100% sensitive to imipenam, 66.6% sensitive to amikacin. Also comparable with Bose *et al* (2013)<sup>8</sup> reported *Acinetobacter lwoffii* was 100% sensitive to polymyxin-B, colistin, imipenam, 71.42% sensitive to amikacin.

## CONCLUSION

The present studied showed that aminoglycoside, quinolone and carbapenem resistant *Acinetobacter* species is increasing gradually. Therefore, it is important to determine the resistance profile for hospital settings in order to choose the proper antibiotic for empirical treatment. *Acinetobacter* species is crucial, through the restricted use of antimicrobials, and the enforcement and surveillance of antibiotic Stewardship Programs in health care settings.

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