Antibiogram of *Acinetobacter Species* Isolated from Various Clinical Specimens in A Tertiary Care Hospital from North India.

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ABSTRACT

Background: *Acinetobacter species* are most common pathogen to cause nosocomial infection, especially to the immune compromised patients or patients who are admitted in Hospital. These species causes UTI, Pulmonary infection, Septicaemia, Wound and soft tissue infection. **Methods:** In this study, total samples collected were 2404 in which 1700 were positive where as 289 were non-lactose fermenter & 1411 were lactose fermenter. **Results:** Total 89 *Acinetobacter species* isolated from various clinical specimens. Ampicillin/Sulbactum (91.0%), Ciprofloxacin (90.0%) & Ceftriaxone (89.0%) were more resistance & Colistin (72.0%), Meropenem (66.0%) were more sensitive. These species transmitted by patient contact, bedding, clothing, fomites, etc. **Conclusion:** Our study sugests that disinfectant & sterilization more important in routine.

Keywords: *Acinetobacter species,* Nosocomial Infection, Antibiotics sensitivity test.

INTRODUCTION

Acinetobacter species are gram negative, non-lactose fermenter, aerobic, coccobacilli shaped bacteria. It plays a significant role in causing Hospital Acquired Infection (HAI). They are second most prevalent non-lactose fermenter organisms isolated from IPD/OPD clinical specimens.[1] They are commonly present in soil & water as they are saprophytic in nature. Whereas *Acinetobacter species* are also considered to be commensals of throat & skin. The pathogenic role of *Acinetobacter species* is recently understood due to frequent changes in their taxonomic status. The importance's of *Acinetobacter species* are increasing due, to their pathogenic role in HAI being reported.[2,3]

Most of *Acinetobacter species* are isolated from urine, but in recent years its occurrence also increased in blood & other clinical specimens.[4] These organisms mostly cause urinary tract infection, septicaemia, post-operative infections, and pulmonary infection in immunosuppressive patients.[5] *Acinetobacter* outbreaks have been particularly transmitted by the hands of health care workers who have cared for colonised or infected patients, touched contaminated fomites & to the occasional health care workers who carries an epidemic strain. They are also transmitted by environmental contamination (e.g. Hydrotherapy equipment, suction water, blood pressure cuffs, bedding), common sources being vegetables, fruits & other hospital equipment.[6-8]

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These species are fast emerging agents of opportunistic HAI with evolving drug resistance; which become a great problem in hospital set-up, particularly in the CCU or ICU or indoor of patients. They show polymorphism & variable gram stain.[9] Antibiotic resistance shown by *Acinetobacter species* becomes that are expressed frequently in HAI strain include beta-lactamase, alternation in cell-wall channels (porins) & efflux pumps. Mainly A. baumannii shows resistant to aminoglycosides by expressing aminoglycosides-modifying enzymes & also became resistant to quinolones through mutation in the genes.[10]

Infection occurred by *Acinetobacter species* can be controlled by identifying sources, isolating & controlling the excessive use of broad-spectrum antibiotics.[6]

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MATERIALS AND METHODS

The present study was carried out from September-2014 to August-2015 at Hind Institute of Medical Sciences, Safedabad, Lucknow, U.P., India. Total 2404 clinical samples were collected from patients attending hospital. All clinical specimens were collected under aseptic conditions. The received samples in the microbiological laboratory were inoculated on Mac conkey agar & Blood agar incubated over night aerobically at 37^0C temperature. *Acinetobacter species* were identified by motility, gram staining, cultural characteristics (non lactose-fermenting, small, mucoid, small & glistening) & bio-chemical reactions (Catalase, Oxidase, Hugh-Leifson's Oxidation-Fermentation test, Indole, Citrate utilization, Urease, TSI). Speciation was done on the basis of glucose oxidation, gelatine liquefaction, haemolysis,

growth at 37^{0}C and 42^{0}C, malonate assimilation. Antibiotic sensitivity test performed by Kirby-Bauer disk diffusion method on MHA plate by using 0.5% Mc Farland turbidity standards. After incubation period zone of inhibition compared with standard chart of CLSI guidelines 2014.

RESULTS

Total clinical samples collected were 2404, out of which 1700 were positive. From 1700 positive samples, 289 were found to be non-lactose fermenter & 1411 were lactose fermenter. 89 (5.0%) samples out of 289 non-lactose fermenters yielded *Acinetobacter species* further speciation of *Acinetobacter* resulted as *A. bauminnii* 53 (60.0%), *A. lwoffii* 33 (37.0%) and *A.hemolyticus* 03 (3.0%). Maximum *Acinetobacter species* were isolated from urine sample 78 (88.0%) & minimum from ET/Tube 01 (1.12%). Likewise, body fluids were not for *Acinetobacter specimens* except blood, which constituted to 03 (3.00%). Gender classification showed higher prevalence among female 53 (58.0%) than male 36 (40.0%). Acinetobacter infection was more common in age group of 16-40 years 40 (45.0%) & observed minimum in age group of infants less than 1 years 02 (2.0%).

Higher resistance pattern shown towards Ampicillin/sulbactum, ciprofloxacin & ceftriaxone were 91.0%, 90.0% & 89.0% respectively. Low resistance shown by colistin (27.0%), Meropenem (28.0%). Higher sensitive was found in colistin, meropenem, imipenem 72.0%, 66.0%, 60.0% respectively.

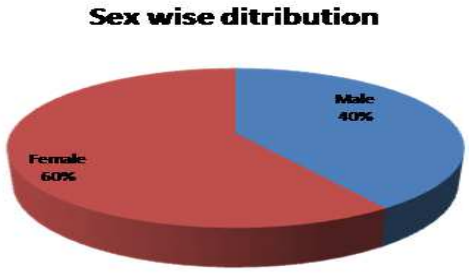

Figure 1: Sex wise distribution of *Acinetobater species*.

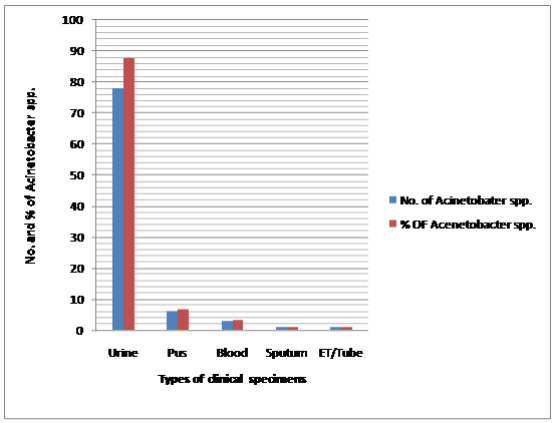

Figure 2: Isolation of *Acinetobacter species* from various clinical specimens.

Table 1: Antibiotics sensitivity pattern of *Acinetobacter species*.

Name of Antibiotics	Sensitive n (%)	Intermediate n (%)	Resistance n (%)
Amikacin	20 (22.0%)	05 (6.0%)	64 (72.0%)
Gentamycin	12 (14.0%)	03 (3.0%)	74 (83.0%)
Ceftriaxone	08 (9.0%)	02 (2.0%)	79 (89.0%)
Cefotaxime	09 (10.0%)	03 (3.0%)	77 (87.0%)
Ciprofloxacin	07 (8.0%)	02 (2.0%)	80 (90.0%)
Tetracycline	09 (10.0%)	02 (2.0%)	78 (88.0%)
Ampicilin/Sulbactum	05 (6.0%)	03 (3.0%)	81 (91.0%)
Imepenem	53 (60.0%)	01 (1.0%)	35 (39.0%)
Cotrimoxazole	13 (15.0%)	02 (2.0%)	74 (83.0%)
Colistin	64 (72.0%)	01 (1.0%)	24 (27.0%)
Pipracilin-tazobactum	37 (41.0%)	07 (8.0%)	45 (51.0%)
Norfloxacin	26 (29.0%)	05 (6.0%)	58 (65.0%)
Meropenem	59 (66.0%)	05 (6.0%)	25 (28.0%)

Table 2: Antibiotics sensitivity pattern of *Acinetobacter species*.

Name of Antibiotics	*A. bauminnii*			*A. lowffii*			*A. hemolyticus*		
	S	I	R	S	I	R	S	I	R
Amikacin	02 (2.0%)	03 (3.0%)	40 (45.0%)	13 (15.0%)	02 (2.0%)	18 (20.0%)	05 (6.0%)	00 (0.0%)	06 (7.0%)
Gentamycin	01 (1.0%)	00 (0.0%)	50 (56.0%)	04 (5.0%)	01 (1.0%)	16 (18.0%)	07 (8.0%)	02 (2.0%)	08 (9.0%)
Ceftriaxone	02 (2.0%)	00 (0.0%)	53 (60.0%)	02 (2.0%)	01 (1.0%)	12 (13.0%)	04 (5.0%)	01 (1.0%)	14 (16.0%)
Cefotaxime	01 (1.00%)	01 (1.0%)	50 (56.0%)	02 (2.0%)	01 (1.0%)	20 (23.0%)	06 (7.0%)	01 (1.0%)	07 (8.0%)
Ciprofloxacin	01 (1.0%)	00 (0.0%)	58 (65.0%)	02 (2.0%)	01 (1.0%)	12 (14.0%)	04 (5.0%)	01 (1.0%)	10 (11.0%)
Tetracycline	01 (1.0%)	00 (0.0%)	49 (55.0%)	05 (6.0%)	01 (1.0%)	17 (19.0%)	03 (3.0%)	01 (1.0%)	12 (17.0%)
Ampicillin/ Sulbactum	00 (0.0%)	01 (1.0%)	68 (77.0%)	01 (1.0%)	01 (1.0%)	10 (11.0%)	04 (5.0%)	01 (1.0%)	03 (3.0%)
Imipenem	11 (12.0%)	00 (0.0%)	20 (23.0%)	20 (23.0%)	00 (0.0%)	10 (11.0%)	22 (25.0%)	01 (1.0%)	05 (5.0%)
Cotrimoxazole	03 (3.0%)	00 (0.0%)	51 (57.0%)	05 (6.0%)	02 (2.0%)	11 (12.0%)	05 (6.0%)	00 (0.0%)	12 (14.0%)
Colistin	18 (20.0%)	00 (0.0%)	10 (11.0%)	21 (24.0%)	00 (0.0%)	08 (9.0%)	25 (28.0%)	01 (1.0%)	06 (7.0%)
Pipracilin-tazobactum	09 (10.0%)	02 (2.0%)	20 (23.0%)	13 (14.0%)	01 (1.0%)	15 (17.0%)	15 (17.0%)	04 (5.0%)	10 (11.0%)
Norfloxacin	04 (5.0%)	00 (0.0%)	30 (34.0%)	10 (11.0%)	01 (1.0%)	18 (20.0%)	12 (13.0%)	04 (5.0%)	10 (11.0%)
Meropenem	16 (18.0%)	00 (0.0%)	12 (13.0%)	20 (22.0%)	01 (1.0%)	08 (9.0%)	23 (26.0%)	04 (5.0%)	05 (6.0%)

(S-Sensitive, I-Intermediate, R-Resistant)

DISCUSSION

The genus name *Acinetobacter* was derived from the Greek word “akinetos” meaning non-motile.[11] *Acinetobacter* is an important pathogen implicated in number of nosocomial infections for examples UTI, bacteraemia, secondary meningitis, infective endocarditis & burn & wound infections.[12] In immune compromised patients of the mortality rate ranges from 20-60% due to *Acinetobacter species* infection. The high risk factors include long-term intubation lung or tracheal aspiration. The equipment used for artificial ventilation such as bronchoscopes Et/tube. Some cases have also been reported to infect skin & soft tissue in traumatic injuries & post-surgical wounds.[13,14]

In this study, all the processing of specimens was followed under aseptic condition & organism identified based on motility test, gram reaction, cultural characteristics & bio-chemical reaction. In antibiotic sensitivity test, zone of inhibition was reported after comparison with standard chart of CLSI guidelines 2014. In our finding, a total of 89 (5.0%) *Acinetobacter species* was isolated from various clinical specimens. In which maximum no. of *Acinetobacter species* were found in urine sample 78 (88.0%). In *Acinetobacter species, especially A. bauminnii* plays important or significant role causing UTI. UTI is the most common infection included in nosocomial infection. Pus 06 (7.0%), Blood 03 (3.0%), Sputum 01 (1.0%) & ET/tube 01 (1.0%) yielded positive for *Acinetobacter species*. But in other body fluids they were not isolated. Few no. of *Pseudomonas aeruginosa* were more frequency isolated among non-lactose fermenter. Environmental contamination of hospital wards with contaminants such as dust, bedding, and long-term incubated intra-tracheal tube are the main causes of colonization of *Acinetobacter species*. They are mainly responsible for pulmonary infection, septicemia & wound infections or post-operative infection. Higher prevalence was found in the age group of 16-40 years 40 (45.0%). It can be attributed, as this age group is more common in facing outside environment rather than being indoors. In antibiotic sensitivity test high resistance shown towards ciprofloxacin (90.0%), ceftriaxone (89.0%) & Ampicillin/Sulbactum (91.0%). Where high sensitive were shown towards colistin (72.0%), Meropenem (66.0%). The resistance pattern observed may be due to mutation of bacterial gene.

In previous studies, 4.0% *Acinetobacter species* were isolated from various clinical samples most of them are isolated from urine & pus.[15] Which coincides with our study results. Resistance of *Acinetobacter species* towards & maximum prevalence was reported high around 23.0% in various studies &

high sensitive towards colistin was also reported. [16-18]

CONCLUSION

Acinetobacter is one of the major species which causes Hospital Acquired Infection. The increasing prevalence of *Acinetobacter* species can create more serious problems like to immunosuppressive patients such as UTI, pulmonary infection, septicaemia & wound infection. Contamination of the hospital environment is a major source (bedding, clothing, fomites, medical instruments etc.) of transmission. Thus, special care should be taken on personal hygiene, aseptic process in a hospital environment. Uses of proper antibiotics should be strictly followed to avoid occurrence of MDR & ESBL isolates. Hospital environment should be clean & properly maintained to reduce the chances of Hospital Acquired Infection.

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