Acinetobacter infections in critical care units – A study on its clinico epidemiological pattern and antibiotic sensitivity profile from a rural teaching hospital in West Bengal, India.

Dr Anirban Bhaduri[1], Dr Paulami Palchowdhury[2], Dr Somnath Ghosh[3], Dr Sayani Bose[4*]

[1*]Associate Professor and HOD, Department of Microbiology, Tamralipto Government Medical College and Hospital, Tamluk, Purba Medinipur, West Bengal, India
[2]Senior Resident, Department of Microbiology , Sarat Chandra Chattopadhyay Government Medical College and Hospital, Uluberia, Howrah, West Bengal.
[3]Assistant Professor, Department of Pathology,Malda Medical College and Hospital, Malda, West Bengal, India

*Corresponding author – Dr Sayani Bose
*Senior Resident, Department of Microbiology, Tamralipto Government Medical College and Hospital, Tamluk, Purba Medinipur, West Bengal, India

ABSTRACT
BACKGROUND- *Acinetobacter spp* has emerged as an important cause of nosocomial infection among immunocompromised patients and those with prolonged hospital stay, particularly in intensive care units (ICUs). These infections are often difficult to treat due to the widespread resistance of the bacteria to major groups of antibiotics. Therefore, antibiotic selection for empirical therapy is challenging and must be reliedupon recent institutional-level susceptibility data.
AIMS- To determine the clinco-epidemiological profile of Acinetobacter spp isolated from different ICU patients and to identify their antibiotic sensitivity pattern in a rural tertiary care hospital .
MATERIALS AND METHODS- The study was conducted from August 2023 to July 2024 at the Department of Microbiology of Tamralipto Government Medical College and Hospital, Tamluk, West Bengal with 1911 samples received from patients admitted in the intensive care units of various department of our hospital.
The aseptically collected specimens were inoculated on MacConkey agar & Blood agar and incubated aerobically at 37^0C for 24-48 hrs. Presumptive identification was done on the basis of colony characteristics and Gram staining, followed by confirmation with standard biochemical tests.
Antibiotic sensitivity testing was performed by KirbyBauer disk-diffusion method on Muller Hinton Agar according to CLSI (Clinical Laboratory Standard Institute) guidelines 2023.
RESULTS- Out of total 1911 clinical samples1160 turned out to be culture positive and out of those culture positives, Acinetobactersp was detected from 54 samples (4.66%). Maximum number were detected from pus samples (35.19%) followed by blood (22.22%), urine (18.52%), respiratory samples and other body fluids. Elderly age group (>60 years) was the most affected by *Acinetobactersp* infection. >80% resistance was observed towards several classes of antibiotics such as Aminoglycosides, Cephalosporins, Fluoroquinolones, Tetracyclines while maximum sensitivity was seen towards Colistin.
CONCLUSION- The MDR nature of *Acinetobactersp*poses a severe threat to immunocompromised patients and ICU inhabitants which highlights the importance of surveillanceat health-care setups to identify colonizers and plan effective infection control strategies,combined with antibiotic stewardship program for developing new treatment options.

KEY WORDS – Acinetobacter spp, MDR,Nosocomial infections.

INTRODUCTION-
Acinetobacter spp. is a ubiquitous saprophytic gram negative coccobacilli which has emerged as a serious and important cause of nosocomial infectionslike septicemia, pneumonia, wound sepsis, endocarditis, meningitis and urinary tract infection (UTI) in hospitals worldwide.[1,2] *Acinetobacter* infections are highly observed in immunocompromised patients and those with prolonged hospital stay, particularly among patients in intensive care units (ICUs), resulting in high morbidity and mortality.[3,4]
These infections are often difficult to treat due to the widespread resistance of the bacteria to major groups of antibiotics.[2] This is because *Acinetobacter* is known for its intrinsic resistance to antibiotics as well as its ability to acquire resistance genes as mobile genetic elements such as plasmids, transposons, integrons cassettes and insertion sequences.[5-7]

Due to the above reasons, antibiotic selection for empirical therapy is challenging and must be reliedupon recent institutional-level susceptibility data.[8] Therefore, the current study was undertaken to evaluate the

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clinico-epidemiological profile of *Acinetobacter* spp. infections andfind the recent trend of drug resistance amongst these bacteria in a tertiary care hospitalof West Bengal.

AIMS-
To determine the clinco-epidemiological profile of Acinetobacter spp isolated from different ICU patients and to identify their antibiotic sensitivity pattern in a rural tertiary care hospital .

MATERIALS AND METHODS-
This is a cross sectional study which was performed from August 2023 to July 2024 at the Department of Microbiology of Tamralipto Government Medical College and Hospital, Tamluk, West Bengal. The study included 1911 samples received from patients admitted in the intensive care units of various department of our hospital including medicine,surgery, obstetrics and gynecology and pediatric ICU.

The specimens included urine, blood ,bronchoalveolar lavage (BAL) fluid, endotracheal (ET) tube aspirate, pus, cerebro-spinal fluid (CSF)and other body fluids.The aseptically collected specimens were inoculated on MacConkey agar & Blood agar and incubated aerobically at 37^0C for 24-48 hrs. Presumptive identification was done on the basis of colony characteristics and Gram staining, followed by confirmation with standard biochemical tests such as catalase test, oxidase test, nitrate reduction test, oxidative/fermentative test.
Antibiotic sensitivity testing was performed by KirbyBauer disk-diffusion method on Muller Hinton Agar according to CLSI (Clinical Laboratory Standard Institute) guidelines 2023.

RESULTS-
Out of total 1911 clinical samples received from various departmental intensive care units, 1160 turned out to be culture positive and out of those culture positives, Acinetobactersp was detected from 54 samples (4.66%). Maximum number were detected from pus samples (35.19%) followed by blood (22.22%), urine (18.52%), sputum (9.26%), ET tube (7.41%), BAL fluid (3.70%), CSF (1.85%) and ascitic fluid (1.85%). Table 1 shows the distribution of *Acinetobacter sp* among various clinical samples.
Maximum number of *Acinetobacter sp* was detected from Medicine ICU (51.85%) followed by paediatric ICU (20.37%), Surgery ICU (18.52%) and gynaecology ICU (9.26%). The department wise distribution of *Acinetobacter sp* has been shown in Table 2.
Figure 1shows that *Acinetobacter* infection was observed more among male patients (70.37%) than female patients (29.36%).

In the age group distribution shown in Figure 2 it has been observed that the elderly age group (>60 years) was the most affected by *Acinetobactersp* infection.
In Table 3 showing antibiotic susceptibility pattern of Acinetobacter strains, >80% resistance was observed towards several classes of antibiotics such as Aminoglycosides, Cephalosporins, Fluoroquinolones, Tetracyclines while maximum sensitivity was seen towards Colistin.

Table 1: Distribution of *Acinetobacter sp*. among various clinical samples

Clinical samples	No of *Acinetobacter sp* detected n=54	Percentage
Blood	12	22.22%
Pus	19	35.19%
Urine	10	18.52%
Sputum	5	9.26%
CSF	1	1.85%
Ascitic fluid	1	1.85%
ET tube	4	7.41%
BAL fluid	2	3.70%

Table 2: Departmental ICU wise distribution of cases

Department wise ICU	No of A*cinetobactersp* detected n=54	percentage
Medicine ICU	28	51.85%
Gynaecology & Obstetrics ICU	5	9.26%
Paediatric ICU	11	20.37%
Surgical ICU	10	18.52%

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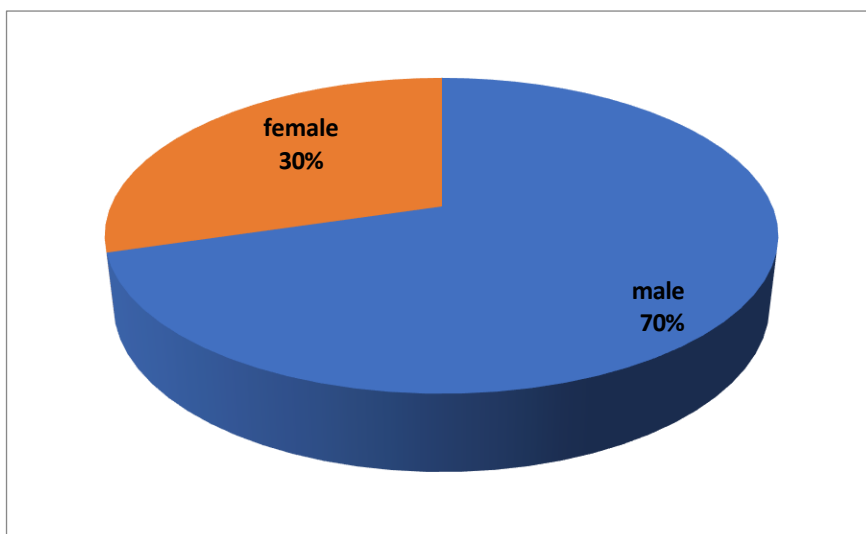
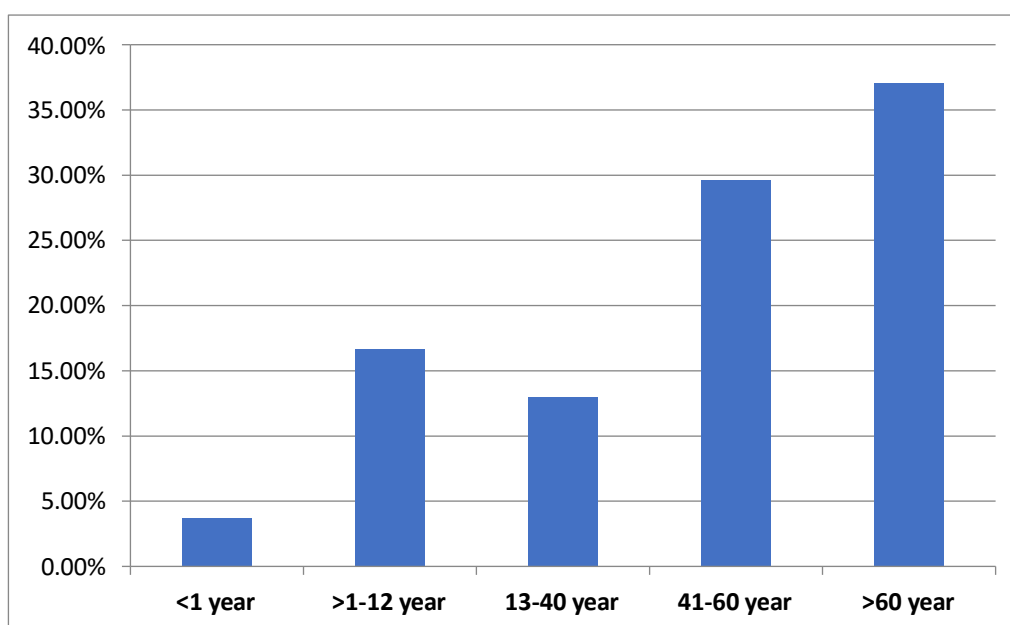**Figure 1: Gender wise distribution of cases**

Figure 2: Age group wise distribution of cases

Table 3: AST pattern among Acinetobacter isolates

Antibiotics	Sensitive	Intermediate	Resistant
Amikacin	5 (9.26%)	2 (3.70%)	47 (87.04%)
Gentamicin	6 (11.11%)	3 (5.56%)	45 (83.33%)
Ceftriaxone	6 (11.11%)	2 (3.70%)	46 (85.19%)
Cefotaxime	7 (12.96%)	2 (3.70%)	45 (83.33%)
Ciprofloxacin	6 (11.11%)	3 (5.56%)	45 (83.33%)
Tetracycline	8 (14.81%)	2 (3.70%)	44 (81.48%)
Cefoperazone-Sulbactam	34 (62.96%)	3 (5.56%)	17 (31.48%)
Imipenem	36 (66.67%)	4 (7.41%)	14 (25.93%)
Cotrimoxazole	8 (14.81%)	2 (3.70%)	44 (81.48%)
Colistin	42 (77.78%)	1 (1.85%)	11 (20.37%)

DISCUSSION-

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Acinetobacter sp has emerged as an opportunistic nosocomial pathogen which is often multidrug resistant (MDR) and is responsible for life threatening infections among hospitalized patients, particularly in ICUs.[3,9,10,11] Its ability to survive on inanimate objects, particularly hospital surfaces and equipments, for prolonged periods of time makes it extremely difficult to control the nosocomial spread.[3,12]

In our study *Acinetobacter sp* accounted for 4.66% of culture positive samples which is a similar finding to few previous studies.[1,13,14] Other studies by Dash M *et al*[15] and Gupta N *et al*[16] also show close findings to our study with *Acinetobacter sp* accounting for 3% and 3.36% of culture positive samples respectively. On the other hand studies by Oberoi *et al*[17] and Lahiri KK *et al*[18] have shown higher incidence of Acinetobacter infection.

In the present study maximum number of *Acinetobacter sp* was isolated from pus (35.19%) followed by blood (22.22%) urine (18.52%) and respiratory samples, similar findings have been shown in studies by Islahi Sana *et al*[1], Dash M *et al*[15] and Mishra *et al*[19]. But studies by Sinha *et al*[13] and Padersen *et al*[20] show maximum number of *Acinetobacter sp* were isolated from urine while in the study by Kaur TA *et al*[3] maximum number of *Acinetobacter sp* was isolated from respiratory samples.

The departmental ICU wise distribution of *Acinetobacter sp* in our study has shown maximum number of *Acinetobacter sp* was detected from Medicine ICU (51.85%) followed by paediatric ICU (20.37%), Surgery ICU (18.52%) and gynaecology ICU (9.26%).

Similar to the study by Islahi Sana *et al*[1], Acinetobacter infection in the present study was observed more among male patients (70.37%) than female patients (29.63%). Patients above 40 years age were affected the highest in our study which is similar to the finding in the study by Gupta N *et*al.[16] The reason might be due to reduced immunity as well as associated co-morbidities and chronic diseases in this age group.[16]

Susceptibility pattern of Acinetobacter strains to various antibiotics shows quite high prevalence of multi drug resistance.>80% resistance was observed towards several classes of antibiotics such as Aminoglycosides, Cephalosporins, Fluoroquinolones and Tetracyclines while maximum sensitivity (77.78%) was seen towards Colistin.31.48% resistance was seen towards Cefoperazone-Sulbactam and 25.93% resistance towards Imipenem. Several previous studies[1,3,15,16] have also shown multi drug resistance (MDR) of *Acinetobacter sp*. The above observation of broadspectrum antimicrobial resistance makes the management of *Acinetobacter sp* infections challenging and thus, shows the importance of taking serious measures to restrict the use of antimicrobials for only situations where they are actually needed and with proper dosing for a proper duration of time.[3]

CONCLUSION-

The MDR nature of *Acinetobacter sp* poses a severe threat to immunocompromised patients and ICU inhabitants. This highlights the importance of strengthening surveillance and monitoring at health-care setups to identify colonizers and reservoirs of this microorganism and plan effective infection control strategies. This should becombined with antibiotic stewardship program for developing new treatment options for these hospital-based MDR *Acinetobacter sp*.

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