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Prevalence of *Acinetobacter spp in* ICU at Tertiary Care Hospital, VIMSAR, BURLA

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Abstract: ***Prevalence of Acinetobacter spp in ICU at tertiary care hospital, VIMSAR, BURLA. Introduction: Acinetobacter spp infections are the emerging pathogen in intensive care units (ICU) patients. Over the last three decades, Acinetobacter spp has transformed from a pathogen of questionable clinical significance to one of the most virulent, multidrug-resistant, pathogenic bacteria in the ICU. So present day study is carried out in Microbiology department of tertiary care hospital and teaching institute. During the study period all samples are collected from patients in ICU of VIMSAR, BURLA and processed for the identification and antimicrobial susceptibility of isolates in microbiology department of VIMSAR, BURLA Aim & Objectives: Primary objective: To identify the prevalence of Acinetobacter spp in clinical sample of ICU patients at VIMSAR, BURLA. Secondary objective: To identify the antibiotic susceptibility pattern of isolated Acinetobacter spp . To correlate the bacteriological profile of Acinetobacter spp with clinical presentation and demographic profile of patients. Materials and Methods: About all clinically significant, consecutive, non-duplicate isolates from various clinical specimens of ICU were included in this prospective study. The isolates were identified by standard protocols and further tested for antimicrobial resistance by Kirby-Bauer disk diffusion method as per CLSI guidelines. Results: From 25 Acinetobacter isolates, majority were from sputum (24%), endotracheal aspirate (20%), pus (8%), blood (8%) followed by other samples. The present study, Acinetobacter spp. showed high level of resistance to, Cefotaxime (92%), Ciprofloxacin (92%), Cotrimoxazole (88%), Ampicillin + sulbactam(88%), Cefepime (84%), Ceftazidime(84%) Gentamicin (80%), and Amikacin(76%), Piperacillin+Tazobactum (76%), Imipenem (56%).***

Keywords: Acinetobacter species, nosocomial infection, antimicrobial resistance, MDR, CSLI, disk diffusion

1. Introduction

Gram-negative bacterial (GNB) infections are one of the most crucial health problems not only in the community but also in hospitalized patients. Due to the Lipopolysaccharide layer (LPS), GNB's, are known to cause sepsis at a higher rate and hence increased morbidity and mortality of patients. Two large groups, Enterobacteriaceae and the non-fermenters, are responsible for most clinical isolates from cases of gram-negative infections. *Acinetobacter sp* is being credited as an omnipresent Gram-negative coccobacilli, belonging to family Moraxellaceae.1

The bacteria are saprophytic, non-fastidious, rigidly aerobic, non-motile and known to exhibit pleomorphism. They form a part of normal resident flora of skin, respiratory and intestinal tract. *Acinetobacter spp* are oxidase negative organisms with an affirmation for catalase test.2

Hence, this study was designed to have an overview of the prevalence of *Acinetobacter* sp. in the ICU patients of a tertiary care hospital, VIMSAR, BURLA, ODISHA INDIA, along with their concurrent sensitivity/resistance patterns toward commonly used or last resort antibiotics, so as to timely design out effective infection control measures against the same.

2. Aims and Objectives

Primary objective – To identify the prevalence of *Acinetobacter spp* in clinical sample of ICU patients at VIMSAR, BURLA**.**

Secondary objective – To identify the antibiotic susceptibility pattern of isolated *Acinetobacter spp.* To correlate the bacteriological profile of *Acinetobacter spp* with clinical presentation and demographic profile of patients.

3. Materials and Methods

Study setting: The study was carried out in a 400 bedded hospital, tertiary care teaching hospital with 4 ICUs (medical, surgical, pediatric and neonatal), located in VIMSAR, BURLA.

Type of study & methodology: This is a retrospective study carried out over one year from January 2021 to December 2021. All the samples from various departments submitted to the microbiology laboratory for culture and antibiotic susceptibility during this one year were included in the study. All samples were subjected to routine microscopy, Gram staining and inoculated onto Blood agar and MacConkey agar for primary isolation and incubated aerobically at 37°C for 18-24 hours.3 Identification of isolates was performed by standard conventional methods based on the colony morphology, preliminaries like gram staining, catalase, oxidase, motility. Various biochemical tests were used to identify genus *Acinetobacter* like indole, citrate utilization test, urease test, triple sugar iron agar test, phenylalanine deaminase test. Identification of *Acinetobacter baumanni* species was made conventionally using specific tests like oxidative/fermentation glucose test, Arginine decarboxylation, and growth at 42°C.4 Antibiotic susceptibility testing was performed by the Kirby Bauer disc diffusion method on Mueller-Hinton agar plates and interpreted according to the CLSI guidelines.5

All the *Acinetobacter* isolates were tested for their antibiotic susceptibilities for various classes antimicrobials using the following antibiotic discs Cephalosporins (ceftazidime, ceftriaxone), Aminoglycosides, (Gentamicin, Amikacin), Fluoroquinolones (Levofloxacin, Ciprofloxacin), beta-lactam and beta-lactamase inhibitor combination drugs

(Ampicillin + Sulbactam, Piperacillin+ Tazobactum), carbapenem (imipenem, meropenem). Isolates showing resistance to three or more classes of antibiotics were categorized as (multidrug-resistant) MDR *Acinetobacter spp*. Isolates resistant to all commonly used antibiotics were pan-resistant.6

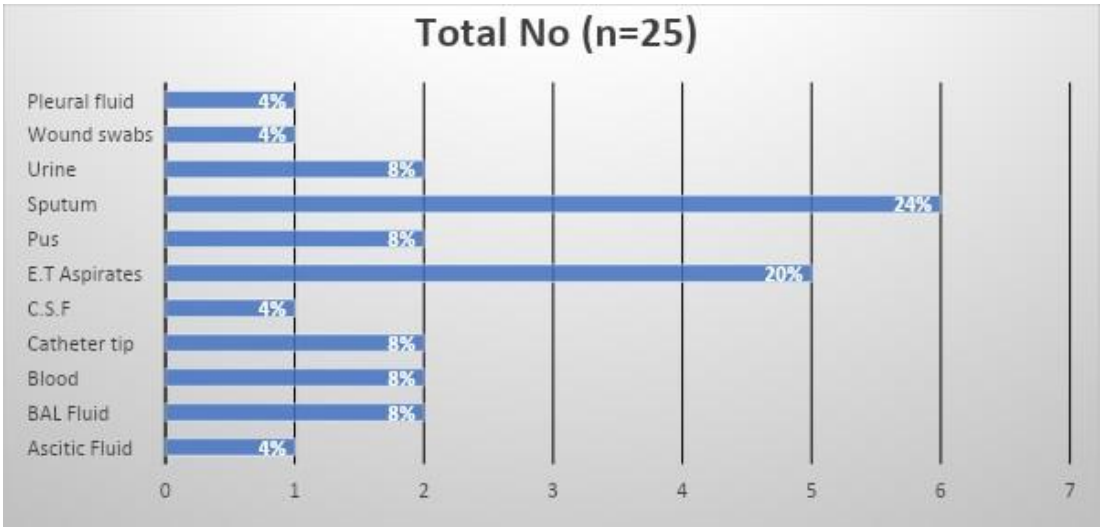
4. Results

From 25 *Acinetobacter* isolates, majority were from sputum (24%), endotracheal aspirate (20%), pus (8%), blood (8%) followed by other samples. The present study, *Acinetobacter spp*. showed high level of resistance to, Cefotaxime (92%), Ciprofloxacin (92%), Cotrimoxazole (88%), Ampicillin +sulbactam (88%), Cefepime (84%), Ceftazidime (84%) Gentamicin (80%), and Amikacin (76%), Piperacillin+Tazobactum (76%), Imipenem (56%), and Meropenem (48%).

However, among carbapenems, Imipenem (56%), Meropenem (48%) showed less resistance as most appropriate solution. This hospital-based epidemiological data will help to implement better infection control strategies and improve the knowledge of resistance pattern in our region.

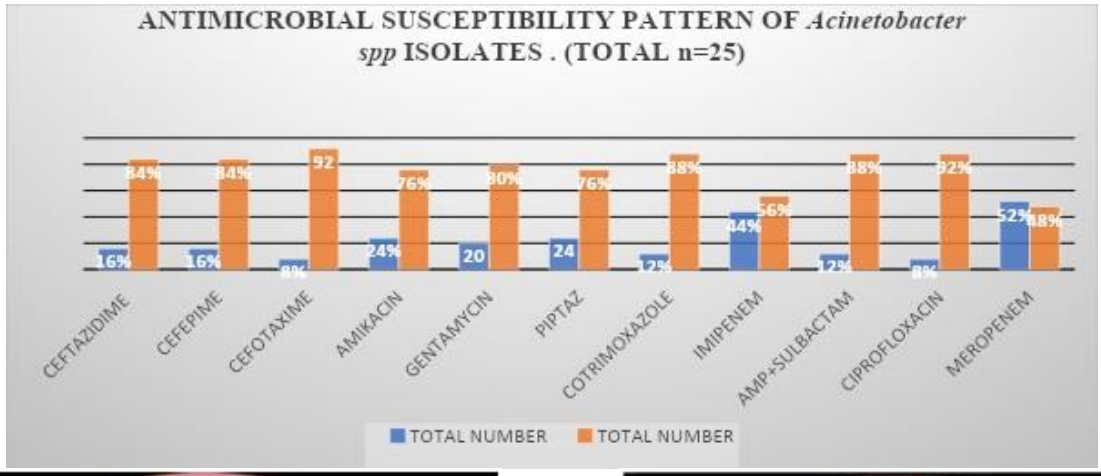
Distribution of Acinetobacter spp isolates from various clinical samples

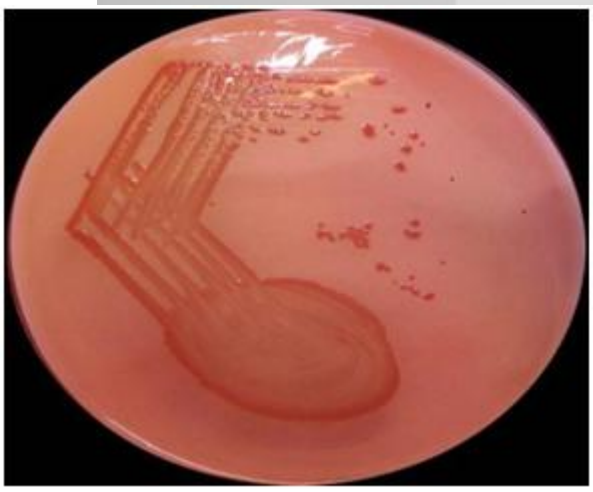
Samples	Total No (n=25)	Percentage (%)
Ascitic Fluid	1	4
BAL Fluid	2	8
Blood	2	8
Catheter tip	2	8
C. S. F	1	4
E. T aspirates	5	20
Pus	2	8
Sputum	6	24
Urine	2	8
Wound swabs	1	4
Pleural fluid	1	4

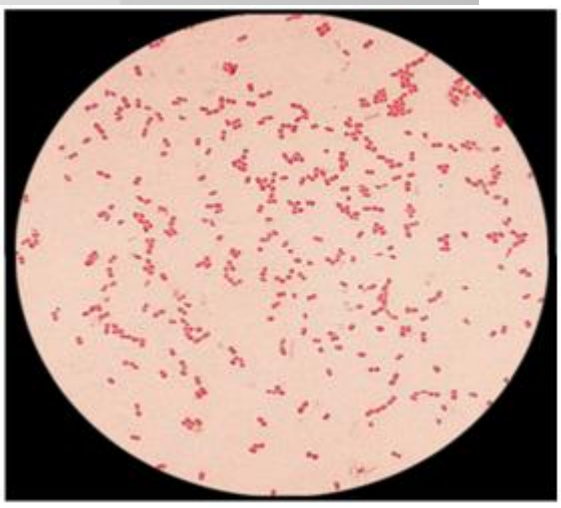


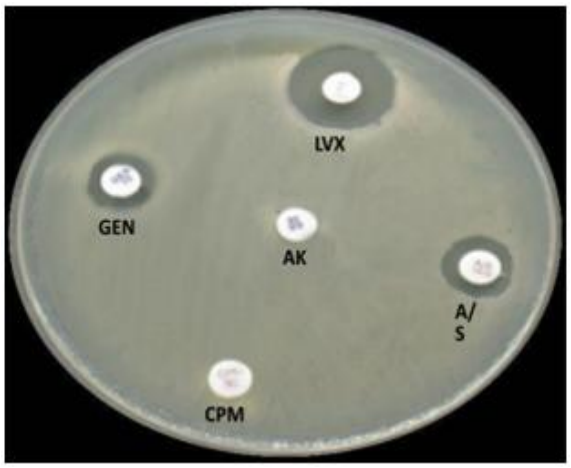
Antimicrobial Susceptibility Pattern of *Acinetobacter spp* Isolates.

Drugs	Total Number & Precentage			
	Sensitive		Resistant	
CEFTAZIDIME	4	16%	21	84%
CEFEPIME	4	16%	21	84%
CEFOTAXIME	2	8%	23	92%
AMIKACIN	6	24%	19	76%
GENTAMYCIN	5	20%	20	80%
PIPTAZ	6	24%	19	76%
COTRIMOXAZOLE	3	12%	22	88%
IMIPENEM	11	44%	14	56%
AMP+SULBACTAM	3	12%	22	88%
CIPROFLOXACIN	2	8%	22	92%
MEROPENEM	13	52%	12	48%









5. Discussion

Acinetobacter infections presents a global medical challenge because it is an important opportunistic pathogen in health care institutions. It has gained importance because of its ability to survive under a wide range of environmental conditions, having numerous intrinsic and acquired drug resistance mechanisms and the emergence of multidrug and pandrug resistant strains.7 In the present study, the distribution of *Acinetobacter* species in various clinical specimens was in the following order, sputum specimen 6 (24%), endotracheal aspirate 5 (20%), wound swab 1 (4%), blood 2 (8%), pus 2 (8%), BAL fluid 2 (8.00%), CSF 1 (4%), pleural fluid 1 (4%) and ascitic fluid 1 (4%). The maximum number of *Acinetobacter* isolates were from respiratory samples 13 (52.00%). Similar results were shown by Lakshmi et al (20%) and Jean et al (44.67%) in their studies. This is very similar to the study conducted by Apoorva Tripathi et al. where 35.78% of isolates were from respiratory specimens 8, 9 where as Muktikesh Dash et al. in his study reported that *Acinetobacter* isolates were common from pus sample 56.9%.10

In our study *Acinetobacter spp* has higher percentage of resistance to various classes of antibiotics and the percentage of resistance was as follows, Cefotaxime (92%), Ciprofloxacin (92%), Cotrimoxazole (88%), Ampicillin +sulbactam (88%), Cefepime (84%), Ceftazidime (84%) Gentamicin (80%), and Amikacin (76%), Piperacillin+Tazobactum (76%), Imipenem (56%), and

Meropenem (48%). (55%) followed by Ceftriaxone (46%) and Ceftazidime (46%). In our study among the 25 isolates, 12 isolates (48%) were found to be resistant to meropenem. The meropenem resistance in this study was high when compared to the study done by Gladstone et al. and Sinha et al. where they have documented 14.2% and 28% of meropenem resistance respectively.11, 12 Very high level of meropenem resistance 89.6% was reported by Namita jaggi et al. Mindolli PB et al found, 9.5% of the isolates resistant to Meropenem which is in contrast to our findings.13

6. Conclusion

Therefore, in the perspective of this study, it could be concluded that emergence of high grade MDR *Acinetobacter* sp. within the ICUs of VIMSAR, BURLA, India, is the newest problem on the board. The ongoing MDR nature of this pathogen to multiple drugs or even to the last line antibiotics is a severe looming threat with respect to the already immunity weaned ICU inhabitants. The probable escape lies in the thorough periodic monitoring of the health-care setups so as to plan out effective infection control strategies and chalking out new treatment options for genuinely controlling such stubborn hospital-based *Acinetobacter* sp. pathologies within the overall domain of WESTERN ODISHA, India.

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