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Original Research Article

Isolation and Identification of Acinetobacter Spp. from Various Clinical Specimen and their Antibiotic Susceptibility Pattern in PDU Medical College, Rajkot, Gujarat, Western India

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Abstract

***Introduction*:** Up to 25% of healthy adults exhibit cutaneous colonization by *Acinetobacter* and are the most common Gram-negative bacteria carried on the skin of hospital personnel. They are opportunistic pathogens causes a number of outbreaks of infections but their predominant role is in intensive care units. Such infections are often difficult to treat because of widespread resistance to the major groups of antibiotics. ***Materials and Methods*:** Various samples were collected aseptically and transported immediately to the bacteriology laboratory. The pathogens were identified by standard laboratory procedures including Gram's staining, motility, culture, colony characters and biochemical reactions. Antimicrobial susceptibility testing was performed by modified Kirby Bauer method as per the CLSI guidelines. ***Result*:** 128 (3.11%) *Acinetobacter* spp. were isolated from 4112 specimens. Out of these, 72 from general wards and 46 from ICU and 10 from opd. Males (59.37%) are predominant than females (40.62%). The isolates sensitivite to Meropenem (83.59%) followed by Pipracillin-tazobactum (66.41%), Tetracycline (58.59%). Maximum resistance was observed to Cefotaxime (93.75%) followed by Ceftazidime (92.19%) & Cefepime (89.06%). ***Conclusions*:** *Acinetobacter* are the "superbugs" of the modern hospital environment causing significant infections in specific patient populations, especially in patients of ICU which are prone to cause infections due to over use of broad spectrum antibiotics. Awareness to maintain good housekeeping, equipment decontamination, strict attention to hand washing, isolation procedures and control of antibiotic usage, especially in high-risk areas, appear most likely measures to control the spread of *Acinetobacter* spp. in hospitals.

Keywords: Gram Negative Bacteria, *Acinetobacter Spp*, Emerging pathogens, Antimicrobial susceptibility, Antimicrobial Resistance.

INTRODUCTION

Members of genus Acinetobacter are ubiquitous, free living organism that prefer moist environment and can be easily obtained from soil, water, food and sewage [1]. They are usually considered to be opportunistic pathogens, and recently have been reported to cause a number of outbreaks of nosocomial infections in hospitalised patients more in intensive care units (ICUs) like septicaemia, pneumonia, wound sepsis, endocarditis, meningitis and urinary tract infection (UTI) [2, 3]. Such infections are often extremely difficult to treat because of widespread resistance of antibiotics and long hospital stay. *Acinetobacter spp* is intrinsically resistant to several commonly used antibiotics, including aminopenicillins, first, second generation cephalosporins and chloramphenicol [4]. Apart from the intrinsic property, they have a high capacity to acquire resistance to broad-spectrum β- lactams, aminoglycosides, fluoroquinolones and tetracyclines. They have emerged as a highly troublesome pathogen for many institutions especially in intensive care units (ICUs) globally, due to their immense ability to acquire or up-regulate antibiotic drug resistance determinants [5, 6]. Their ubiquitous nature in the ICU environment and inadequate infection control practice has continuously raised.Due to unpredictable multidrug resistance patterns of clinical strains of *Acinetobacter*, it is imperative to know the institutional prevalent susceptibility profiles. Hence, this study was conducted

to isolate the *Acinetobacter* species from various clinical samples and to determine the antibiotic susceptibility pattern of these isolates.

AIMS AND OBJECTIVE

To isolate and identify *Acinetobacter* species from various clinical specimens and to study Antimicrobial Susceptibility Pattern of these isolates.

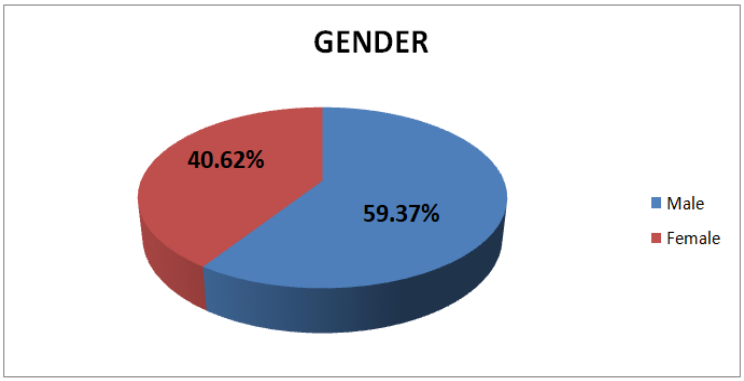
METHODOLOGY

The study was carried out in the Department of Microbiology, PDU Medical College, Rajkot, Gujarat, India for a period of nine month. Relevant clinical specimens (sputum, blood, pus, urine, CSF, pleural fluid, swab, Ascitic fluid) were collected, inoculated on Blood agar and MacConkey agar and incubated at 37^{o}C for 24 to 48 hours. Samples for blood culture were collected in BHI broth (Adult & Paediatric). Urine specimens were inoculated by semi-quantitative method. Colonies of Acinetobacter were non-fermenter with a pinkish tint on MacConkey agar. Microscopy showed gram negative coccobacilli on gram stain. Oxidase test was negative. Citrate and Glucose was positive [7, 8]. The isolates were identified by standard microbiological techniques by studying their colony characteristics (size, shape, elevation, margin, surface, opacity, consistency, pigment production), morphology & Various biochemical tests were used to identify genus *Acinetobacter* like indole, citrate utilization test, urease test, triple sugar iron agar test, phenylalanine deaminase test, oxidative/fermentation glucose test, Arginine decarboxylation, and growth at 42°C. Antimicrobial susceptibility testing was performed by modified Kirby Bauer method. Antimicrobials tested were Amikacin, Ampicilin+Salbactum, Gentamicin, Levofloxacin, Piparacilin, Piparacilin+Tazobactum, Ceftazidim, Cefepime, Meropenem, Tetracyclin, Chloramphenicol as per CLSI guidelines [9].

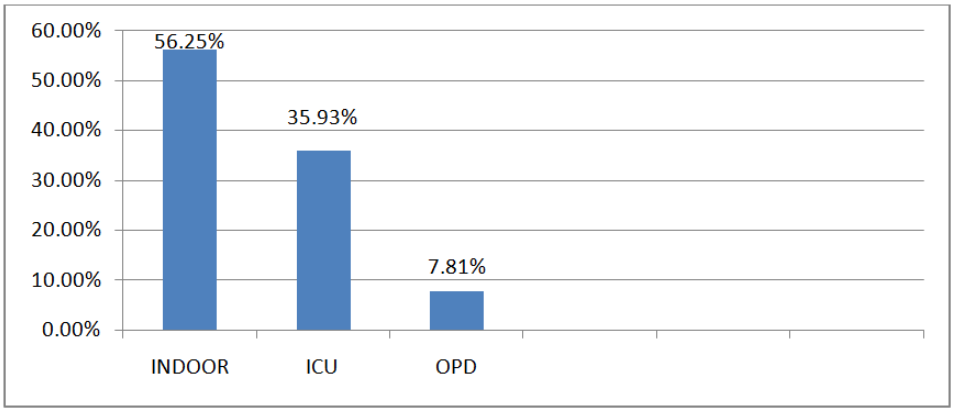
RESULTS

128 (3.11%) *Acinetobacter* spp. were isolated from 4112 specimens. Males (59.37%) are predominant than females (40.62%).Out of 128, 72(56.25%) from general wards and 46(35.93%) from ICU and 10(7.81%) from opd. Acinetobacter was predominantly isolated from pus 44(34.37%), from blood 32(25%), from sputum 26(20.31%), from Urine 12(9.37%), from swab 9(7.03%), from pleural fluid 3(2.34%) and from Ascetic Fluid 2(1.56%).

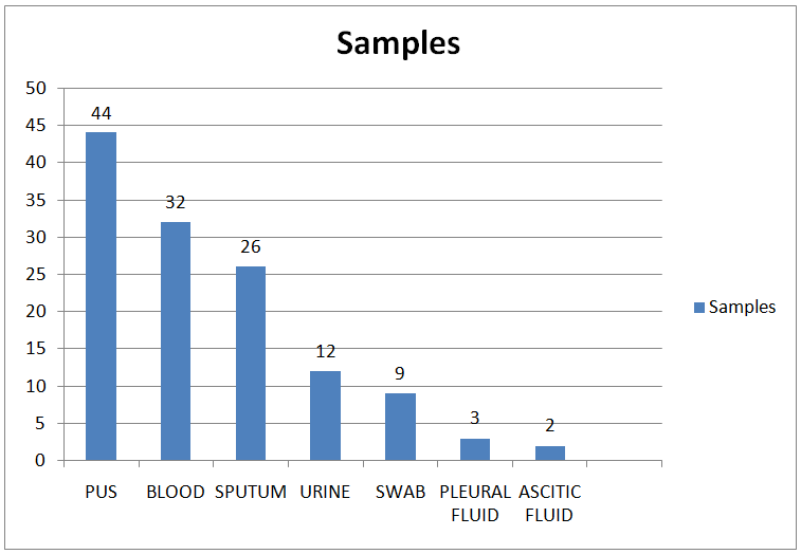
Gender vice Distribution



IPD, OPD, ICU vice Distribution



Sample vice Distribution



The isolates sensitivite to Meropenem (83.59%) followed by Pipracillin-tazobactum (66.41%), Tetracycline (58.59%), Ampicilin/salbactum (32.03%). Maximum resistance was observed to Cefotaxime (93.75%) followed by Ceftazidime (92.19%) & Cefepime (89.06%), Ciprofloxacin (86.72%), Gentamycin (75%). Acinetobacter Spp. isolates from Urine showed 66.67 %resistance to Nitrofurantoin and 33.33% resistance to Norfloxacin.

Antibiotic Drug Sensitivity Pattern

Test/Report Group	Antibiotic	Acinetobacter spp.	
		Sensitive (%)	Resistant (%)
Group A	Meropenem (MRP)	107 (83.59)	21 (16.41)
	Levofloxacin (LV)	34 (26.56)	94 (73.44)
	Ciprofloxacin (CIP)	17 (13.28)	111 (86.72)
	Ceftazidime (CAZ)	10 (7.81)	118 (92.19)
	Ampicilin/Salbactum (A/S)	41 (32.03)	87 (67.97)
	Gentamicin (GM)	32 (25)	96 (75)
Group B	Amikacin (AK)	39 (30.47)	89(69.53)
	Pipracillin-Tazobactum (PIT)	85 (66.41)	43 (33.59)
	Cefotaxime (CTX)	8 (6.25)	120 (93.75)
	Cefepime (CPM)	14 (10.93)	114 (89.06)
	Cotrimoxazole (COT)	35(27.34)	93 (72.66)
Group C	Tetracycline (TE)	75 (58.59)	53 (41.41)
Group U	Norfloxacin (NX)	8 (66.67)	4 (33.33)
	Nitrofurantoin (NIT)	4 (33.33)	8 (66.67)

DISCUSSION

128 (3.11%) *Acinetobacter* spp. were isolated from 4112 specimens. Prevalence of 3.36% of total organisms isolated was reported by Neetu Gupta**,** *et al.*, [10]. Males (59.37%) are predominant than females (40.62%). Ayenew Z *et al.*, [11], showing 64.4 % in Male & 60% in Female. Out of 128, 72(56.25%) from general wards and 46(35.93%) from ICU and 10(7.81%) from opd. In Mahamad W *et al.*, 30% of the isolates were recovered from ICU patients [12]. In contrast, a lower percentage, 11.4%, were isolated from ICU, as reported by Kaur *et al.*, [13].

Acinetobacter was predominantly isolated from pus 44(34.37%) , from blood 32(25%), from sputum 26(20.31%), from Urine 12(9.37%), from swab 9(7.03%), from pleural fluid 3(2.34%) and from Ascetic Fluid 2(1.56%). In Neetu Gupta, *et al.*, *Acinetobacter* species were predominantly isolated from blood samples 41 (36.9%) followed by pus 25 (22.5%), respiratory samples 16 (14.4%), urine 13 (11.7%) [10]. On the other hand, Kaur *et al.*, [13] had shown urinary isolates to be the most common, in contrast to the present study.

The isolates Maximum sensitivite to Meropenem (83.59%) followed by Pipracillin-tazobactum (66.41%), Tetracycline (58.59%). Maximum resistance was observed to Cefotaxime (93.75%) followed by Ceftazidime (92.19%) & Cefepime (89.06%). In Mahamad W *et al.*, Cephalosporins had the highest resistance to the isolates (ceftazidime 82.5% is more resistant than ceftriaxone 78%). In kaur *et al.*, Maximum resistance to Cephalosporins group [13].

CONCLUSION

Acinetobacter are the "superbugs" of the modern hospital environment causing significant infections in specific patient populations, especially in patients of ICU which are prone to cause infections due to over use of broad spectrum antibiotics. To avoid resistance, antibiotic should be used judiciously and empirical antibiotic therapy should be determined based on local antibiotic sensitivity pattern of the prevalent organism of the hospital. A continued awareness of the need to maintain good housekeeping and control of the environment, including equipment decontamination, strict attention to hand washing should undertake to control the spread of *Acinetobacter* in hospitals.

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