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Original Research Article

Phenotypic Characterization of Acinetobacter Species and Their Resistance Pattern in a Tertiary Care Hospital

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ABSTRACT

Acinetobacter spp. have been implicated in recent years as an important nosocomial pathogen. They are being increasingly reported as the casual organism of numerous hospital outbreaks despite of their low pathogenic potential. Due to the confused taxonomic status the appreciation of the importance of the organism is lacking. Therefore the present study was made to type the Acinetobacter spp. by simple phenotypic identification schemes, to determine its resistance patterns and study of clinical demographic pattern. A study of clinical specimens received in Microbiology department, SCB Medical College, Cuttack over a period of one year (01-05-2015 to 01-07-2016). Identification Speciation and antibiotyping was performed from the clinical isolates of Acinetobacter was recovered from clinical samples. Clinical demographic pattern was studied retrospectively. Out of the total 1422 clinical isolates 158(9%) were Acinetobacter spp. The most common species was Acinetobacter baumannii 98(62%). Acinetobacter was predominantly isolated from pus samples 65(42.5%) followed by urine 46(29%) and respiratory samples 30(19%). The most effective antibiotic was Amikacin (78%) followed by Quinolones (73%) and most of the isolates were resident to Cephalosporins and Macrolides group of antibiotics. Multidrug resistant Acinetobacter infection has emerged as an increasing problem. The analysis of speciation and susceptibility pattern will be useful in proper identification and treatment.

Keywords: *Acinetobacter ssp., nosocomial infection, multidrug resistant.*

INTRODUCTION

Acinetobacter is an emerging opportunistic pathogen and increasingly implicated in hospital acquired infection especially in intensive care unit. [1,2] Despite their low pathogenic potential they are being reported increasingly as the casual organism of numerous hospital outbreaks in several countries. [3,4] The infection caused by *Acinetobacter spp.* is difficult to control due to multi drug resistance which limits its therapeutic options. Due to lack of its appreciation and confused taxonomic status it is often underidentified. [5]

The present study was done in an attempt to isolate the *Acinetobacter species* from various clinical samples, identify the different species according to a battery of phenotypic identification tests and to study the antimicrobial susceptibility pattern and correlate them with the clinical demography pattern.

MATERIALS AND METHODS

A study was conducted in Microbiology department, SCB Medical

College, Cuttack over a period of one year (01-07-2015 to 01-08-2016). Identification of *Acinetobacter* was done by their colony character, gram staining appearance, motility and biochemical reaction. [6]

Species identification was done by growth at 37^0C and 44^0C, glucose oxidation in OF media haemolysis on sheep blood gar gelatine liquefaction, carbon assimilation of malonate and citrate, arginine dihydrolase. [7] The Antimicrobial susceptibility tests were carried out by disk diffusion methods to antibiotics like Amikacin (Ak), Gatifloxacin (Gf), Imipenem (I), cefotaxime (Ce), Ceftazidime (Ca), Gentamicin and Ampicillin sulbactam. [8]

RESULTS

During these period of study the total number of clinical isolates were 1422 and among these the non fermenters were 387(27%) and from these *Acinetobacter spp.* Were 154(9% of total or 40% among non fermenters)

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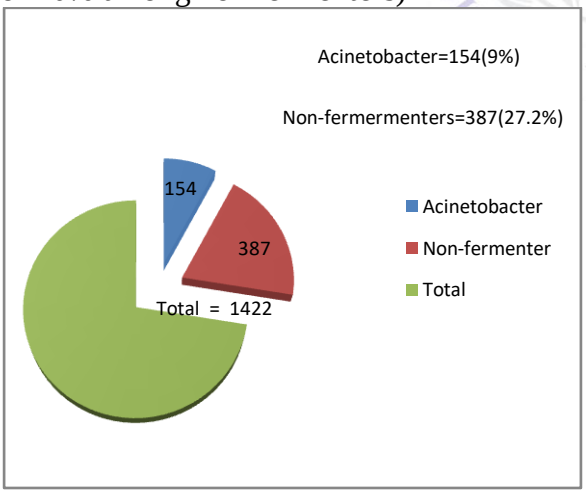

Table-1: Frequency of Acinetobacter Spp. Positive Cases Among Patients of Different Units

Sl. No.	Unit	No. of +ve cases	%(n=154)
	ICU	34	22%
	Medicine	26	17%
	Chest and TB	18	12%
	Surgery	17	11%
	OPD	20	13%
	Paediatrics	14	9%
	O & G	8	5%
	Others	17	11%

Highest isolation was from intensive care unit 34(22%) followed by Medicine ward 22(17%) and Chest wards 18(12%)

Table-2: Frequency of isolation of Acinetobacter spp. From various clinical samples

Sl. No.	SAMPLE	No. of Acinetobacter spp.	%(n=154)
	Pus	52	33%
	Wound swab	13	11%
	Urine	46	29%
	Sputum	19	12%
	Throat swab	11	7%
	Pleural fluid	6	4%
	Blood	8	5%
	CSF	2	1%
	Ascitic fluid	1	0.5%

Highest number of isolates from pus 52(33%) followed by urine 46(29%) and sputum 19(12%)

DISCUSSION

The increasing clinical importance of Acinetobacter spp. is attributed to their capacity to cause nosocomial infection particularly outbreaks in ICU. The most important nosocomial Acinetobacters belong to the Acb complex (70%). [5,9] Highest isolation was from intensive care units 34(22%) followed by Medicine ward 22(17%) and chest units 18(12%). The present study identified about 154(40%) of Acinetobacter among the non-fermenters. Out of which Acb complex is the commonest (70%). Highest number of isolates were from pus 52(33%) followed by urine 46(29%) and sputum 19(12%). However different authors showed highest isolation from respiratory samples followed by urine. [10] This variation may be attributed to the more appropriate nature of samples. The commonest species isolated was A.baumannii98 (62%) followed by A.lwoffii 19(13%). A. baumannii was most commonly isolated from blood. Acinetobacter spp. Showed highest susceptibility to Amikacin 78% followed by Gatifloxacin 73% and imipenem 70%. Highest resistance was shown to ceftazidime 74% followed by other cephalosporins.

Table-3: Frequency of species distribution among the Acinetobacter spp. Isolates and biochemical tests given by them.

Sl. No.	Acinetobacter species	Growth		Glucose oxidation	Arginine Dihydrolase	Haemolysis	Gelatin Liquifaction	citrate	Malonate	No	%
		37^0	44^0								
1.	baumannii	+	+	+	-	-		+	+	98	62%
2.	Iwoffii	+/-	-	-	-	-	-	-	-	17	11%
3.	Calcoaceticus	+	-	+	-	-	-	+	-	11	8%
4.	hemolyticus	+	-	-	-	+	+	+	-	-	-
5.	junni	+	+/-	+	-	-	-	-	-	6	4%
6.	Unidentified species	-	-	-	-	-	-	-	-	13	9%

Table-4: Distribution of various Acinetobacter species among the clinical isolates

Sl. No.	Sample	A Baumannii	A Iwoffii	A Calcoaceticus	A Haemolyticus	A Juni	Unidentified species
1.	Pus	33	2		4	3	5
2.	Wound Swab	7	2	1		1	2
3.	Urine	24	3	2	2	2	3
4.	Sputum	11	1	2	1		
5.	Throat swab	7	1		1		2
6.	Pleural fluid	3	1	1			1
7.	Blood	1	6		1		
8.	CSF	1	1				
9.	Ascitic fluid	1					

A.baumanni predominanted in all samples except blood where it is dominated by A.Lwoffii

Table-5: Susceptibility Pattern Of Acinetobacter Species

Sl. No.	ANTIBIOTIC	SENSITIVE%	RESITANCE%
1.	Amikacin(Ak)	78%	22%
2.	Gatifloxacin(Gf)	73%	27%
3.	Imipenem	70%	30%
4.	Gentamicin(G)	58%	42%
5.	Azithromycin(At)	43%	47%
6.	Ampicillin-Aulbactam(As)	37%	63%
7.	Cefotaxime(Ce)	31%	69%
8.	Ceftazidime(Ca)	26%	74%

Acinetobacter spp. showed highest susceptibility to Amikacin 78% followed by Gatifloxacin 73% and Imipenem 70%. Highest resistance was shown to cephalosporins.

CONCLUSION

Acinetobacter spp. are emerging as multidrug resistant nosocomial pathogen, increasingly involved in hospital-acquired infections. Its prevalence is much more in ICU, where the selective pressure of antibiotics is already high. Therefore simple and rapid phenotypic identification tests along with antimicrobial susceptibility testing may be useful for laboratories with limited resources.

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