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Antimicrobial susceptibility pattern and frequency of Acinetobacter species in different clinical specimens in a diagnostic centre of Madhya Pradesh

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Abstract

Introduction: Acinetobacter species are capable of causing infections such as pneumonia, sepsis in wounds, urinary infections, septicemia, endocarditis and meningitis. Apart from hospital acquired infections there has been a rising trend in community acquired infections with Acinetobacter species. It's intrinsic resistance and multi - drug resistance is posing a major health challenge. Acinetobacter species are becoming increasingly resistant to commonly used antibiotics such as aminoglycosides, fluoroquinolones, broad spectrum B-lactam antibiotics, cephalosporins and carbapenems.11 The aim of this study was to analyse the frequency of isolation of Acinetobacter species in various clinical specimens coming for culture in Microbiology department and also to assess antibiotic sensitivity pattern of the isolates. *Materials and Methods:* This prospective study was conducted between January to April 2018 in the Microbiology department of our centre. 2015 clinical specimens from both sexes and all ages like urine, pus, blood, different body fluids like pleural, ascitic, synovial, sputum and endotracheal tube etc were included in the study *Results:* Significant growth of Acinetobacter was observed in 10 (1.37%) cases .Acinetobacter was isolated from 3 Pus samples, 4 ET secretion samples, and one each from Urine, Throat swab and Body Fluid samples. The isolates were sensitive to only Colistin and Tigecycline with intermediate resistance to Ciprofloxacin and Cefepime and resistant to all the other antibiotics in all clinical specimens. *Conclusion:* Treatment of infections caused by Acinetobacter species is becoming increasingly difficult due to emergence of multidrug and pan drug resistant strains of Acinetobacter. The rampant and injudicious use of antibiotics is a major cause of this emerging drug resistance. A stringent hospital antibiotic policy and infection control policy should be implemented

Keywords: Acinetobacter Species; ET Secretions; Pan Drug Resistance.

Introduction

Bacteria of genus Acinetobacter are found everywhere. They are free living bacteria, saprophytic in nature and can be grown from soil, water, food and sewage [1].

Bacteria of Acinetobacter species are aerobic Gram negative coccobacilli which are glucose, non-

fermenters, oxidase negative and catalase positive and are opportunistic pathogens and are now-a-days an important source of nosocomial infection all around the world. They are commensals of skin and respiratory tract. Acinetobacter bauminii is the most frequently isolated pathogen [2]. The most important cause of its emergence in hospital acquired infections is it's capacity to survive in low humidity as well as developing resistance to antibiotics [3].

Long illnesses with hospitalization in ICUs and invasive procedures like catheterisation and ventilators can help in colonisation of these bacilli and can increase the risk of infection when immunity is low [4,5]. Acinetobacter species are capable of causing infections such as pneumonia, sepsis in wounds, urinary infections, septicemia, endocarditis and meningitis [6]. Apart from hospital acquired infections there has been a rising trend in community acquired infections with Acinetobacter species [7]. It's intrinsic resistance and multi - drug resistance is posing a major health challenge [8]. Throat, respiratory tract and digestive tract colonisation by Acinetobacter species have been documented in earlier outbreaks [9,10].

Acinetobacter species are becoming increasingly resistant to commonly used antibiotics such as aminoglycosides, fluoroquinolones, broad spectrum B-lactam antibiotics, cephalosporins and carbapenems [11].

The aim of this study was to analyse the frequency of isolation of Acinetobacter species in various clinical specimens coming for culture in Microbiology department of Sampurna Sodani Diagnostic Clinic and also to assess antibiotic sensitivity pattern of the isolates.

Materials and Methods

This prospective study was conducted between January to April 2018 in the Microbiology department of our centre. Clinical specimens from both sexes and all ages.

Like urine, pus, blood, different body fluids like pleural, ascitic, synovial, sputum and endotracheal tube etc were included in the study. A total of 2015 specimens were included in the study. Blood culture bottles were incubated in BacTalert (Biomerieux). Rest of the samples were cultured on Blood Agar and Mac-Conkey Agar and incubated at 37^0C for 24 hours. After 24 hours, Gram's staining was done from isolated colonies. Gram negative coccobacilli were identified as Acitenobacter by Vitek II (Biomerieux). Antibiotic susceptibility testing was done on Vitek II (Biomerieux) according to CLSI guidelines.

The patients were divided into 0-20, 21-40, 41-60, 61-80 and >80 years of age group in the both sexes.

Results

A total of 2015 specimens of all ages and sexes were included in the study out of which 917 were from males (45.5%) and 1098 (54.5%) were from females. The M:F ratio was 0.83:1 (Table 1). Out of 2015 specimens, 997 (49.4%) were urine cultures followed by 274 (13.5%) Pus swabs, Sputum 244 (12.1%), Blood cultures 178 (8.83%), Vaginal swabs 122 (6%) (Table 2).

Significant growth of Acinetobacter was observed in 10 (1.37%) cases and no growth was observed in 1288 (63.9%) patients (Table 2). Acinetobacter was isolated from 3 Pus samples, 4 ET secretion samples, and one each from Urine, Throat swab and Body Fluid samples. In 727 (36.1%) patients, bacteria other than Acinetobacter were grown. Maximum patients were between 21-40 years of age (33.8%), followed by 0-20 years (25.1%), 20.9% in 41-60 years, 17.7% in 61-80 years and least (2.33%) in patients above 80 years of age.

The isolates were sensitive to only Colistin and Tigecycline with intermediate resistance to Ciprofloxacin and Cefepime and resistant to all the other antibiotics in all clinical specimens. Table 3 shows the antimicrobial sensitivity pattern and MIC value of Acinetobacter species.

Table 1: Demographic Data of patients

S. No.	Age (years)	Male	%	Female	%	Total	%
1	**0 - 20**	266	29.0%	240	21.9%	506	25.1%
2	**21 - 40**	238	26.0%	444	40.4%	682	33.8%
3	**41 - 60**	173	18.9%	250	22.8%	423	21.0%
4	**61 - 80**	216	23.6%	141	12.8%	357	17.7%
5	**>80**	24	2.62%	23	2.1%	47	2.3%
Total		**917**	45.5%	**1098**	54.5%	**2015**	

Discussion

The bacteria of the genus Acinetobacter are lactose non fermenters, next only to Pseudomonas in the frequency of isolation from clinical specimens specially from hospital acquired infection [12].

Prolonged duration of hospital stay, immunocompromised status of patients, invasive diagnostic procedures and injudicious and rampant use of broad spectrum antibiotics has been a major trigger in colonisation and isolation of Acinetobacter species from various clinical specimens. This has also led to emergence of resistant strains of Acinetobacter species to commonly used antibiotics. Although these species are less virulent, but antibiotic resistance is rapidly acquired by these micro-organisms [13].

In our study, the maximum cases of Acinetobacter isolation was from ET secretions and were sensitive only to Tigecycline and Colistin while intermediate sensitive to Ciprofloxacin. All the 10 cases were resistant to Ampicillin, Amoxycillin/ Clavulinic acid, Piperacillin/ Tazobactum, Cefuroxime, Ceftriaxone, Cefepime, Imipenem, Meropenem, Gentamicin, Nalidixic Acid and Trimethoprim/ Sulfamethoxazole.

Hatice et al. in their study isolated 70% Acinetobacter species from tracheal aspirates, one from blood and wound infection (3.3%) and 6.6% from urine specimens which correlates with our

Table 2:

Sr No	Specimen	Overall Total Patients	Overall % of Total Patients	No Growth		Acinetobacter	
				Total Patients	%	Total Patients	%
1	Urine	997	49.40%	746	74.82%	1	0.10%
2	Blood	178	8.83%	103	57.87%	0	0.00%
3	Pus	274	13.50%	111	40.51%	3	1.09%
4	Sputum	244	12.10%	110	45.08%	0	0.00%
5	Stool	37	1.83%	33	89.19%	0	0.00%
6	Vaginal Swab	122	6.05%	93	76.23%	0	0.00%
7	Throat Swab	93	4.61%	47	50.54%	1	1.08%
8	CSF	15	0.74%	14	93.33%	0	0.00%
9	ET Secretion	11	0.54%	0	0.00%	4	36.36%
10	Body Fluid	29	1.43%	23	79.31%	1	3.45%
11	Semen	12	0.59%	8	66.67%	0	0.00%
12	Breast Abscess	3	0.14%	0	0.00%	0	0.00%
Total		**2015**		**1288**	**63.90%**	**10**	**1.37%**

Table 3: Sensitivity Pattern

Antimicrobial	MIC	Interpretation
Ampicillin	>=32	Resistant
Amoxicillin/ Clavulanic Acid	>=32	Resistant
Piperacillin/ Tazobactam	>=128	Resistant
Cefuroxime	>=64	Resistant
Cefuroxime Axetil	>=64	Resistant
Ceftriaxone	>=64	Resistant
Cefoperazone/ Sulbactam	>=64	Resistant
Cefepime	>=64	Resistant
Imipenem	>=16	Resistant
Meropenem	>=16	Resistant
Gentamicin	>=16	Resistant
Nalidixic Acid	>=32	Resistant
Ciprofloxacin	>=4	Resistant
Tigecycline	2	Sensitive
Nitrofuratoin	>=512	Resistant
Colistin	<=0.5	Sensitive
Trimethoprim/ Sulfamethoxazole	>=320	Resistant

study [14]. However, the isolates were sensitive to Netilmicin, Sulbactam, Amikacin and Meropenem also. While in our study, all antibiotics were resistant except Tigecycline and Colistin.

Muktikesh Dash et al. in their study of 8749 clinical specimens observed sterile specimens in 47.5% cases and Acinetobacter was grown in 3% cases [15]. They found 54.7% isolates to be pan drug resistant. Like our study, all the isolates were 100% sensitive to Colistin.

Rit et al in their study observed growth of Acinetobacter specimen in 3% specimens [16].

Mostofi et al and Joshi et al observed higher prevalence of Acinetobacter in their studies [17,18].

Vijayan et al in their study isolated Acinetobacter species from 122 cases out of 7182 clinical specimens, out of which 17.27% cases were pandrug resistant [19]. In their study, least resistance was seen to Piperacillin-Tazobactum and Imipenem.

The findings of pan drug resistance in our study show the emerging resistance to all antibiotics in Acinetobacter species. Hence, strong and effective infection control measures and judicious use of antibiotics is mandatory for prevention and effective treatment of infections with Acinetobacter species.

Conclusion

Treatment of infections caused by Acinetobacter species is becoming increasingly difficult due to emergence of multidrug and pan drug resistant strains of Acinetobacter. The rampant and injudicious use of antibiotics is a major cause of this emerging drug resistance. A stringent hospital antibiotic policy and infection control policy should be implemented.

Conflict of interest: none

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