Original Article

A study of multidrug resistant acinatobacter species at tertiary health care center

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Abstract

Introduction: *Acinetobacterbaumannii* is an opportunistic pathogen that is frequently involved in outbreaks of infection occurring mostly in intensive care units **Aims and Objectives:** To Study Multidrug resistant Acinatobacter Species at Tertiary health care center. **Methodology:** This was a Cross-sectional study carried out in Microbiology Department at tertiary health care center during one year period from January 2014-2015. All samples were screened for the Acinatobacterand those samples positive were included into study. Total 96 samples were included into study. The statistical analysis done by Chi-square test. **Result:** In our study we have found that The majority of the Patients were from the age group of 20—40 years 39.58% followed by 40—60 years-25.00%; > 60 years-19.791% ;< 5 years-12.5%; 5—20 years-3.125%. Majority of the MDR isolates were from Urology-100%followed by; ICU-90.63%;General Surgery-89.48%Orthopedics-80.00%; Obstetrics and Gynecology;78.57%; Out patients-63.64%.This observed difference is statistically significant ($p< 0.0003$; $x^2 =29.39$, df=8).The majority of the MDR isolates were from ET aspirate-(94.74%) followed by Pus-(84.22%);Blood-(83.33%); Sputum; (75.00%); Urine-(52.94%); Others-(50.00%). This observed difference is statistically significant ($P<0.05$, $X^2 = 13.53$, df= 6). The majority of the antibiotic resistance pattern of MDR and non-MDR *Acinetobacter*isolates to Gentamicin-98.55% followed by Amikacin-98.24%; Co- trimoxazole-97.01%; Imipenem-95.45%; Piperacillin –tazobactam-94.11%; Ciprofloxacin-93.67%; Ceftazidime-93.67%; Ampicillin-80.43%; Amoxycillin –clabulanic acid-88.09%. This observed difference is statistically significant ($P<0.0004$,$X^2= 28.72$ df=8). **Conclusion:** In our study we have found that The majority of the Patients were from the age group of 20—40 years, Majority of the MDR isolates were from Urology, The majority of the MDR isolates were from ET aspirate, The majority of the antibiotic resistance pattern of MDR and non-MDR *Acinetobacter*isolates to Gentamicin, followed by Amikacin, Co- trimoxazole, Imipenem-Piperacillin –tazobactam.

Keywords: Acinatobacter, MDR-Acinatobacter, Gentamicin, Amikacin, Co- trimoxazole, Imipenem-Piperacillin –tazobactam.

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INTRODUCTION

Acinetobacterbaumannii is an opportunistic pathogen that is frequently involved in outbreaks of infection occurring mostly in intensive care units.[1] Members of genus *Acinetobacter* is gram negative, nonmotilenonspore forming encapsulated coccobacilli belonging to family Neisseriaceae.[2] It is an opportunistic pathogen found to be associated with wide spectrum of infection including nosocomial pneumonia, meningitis, endocarditis, skin and soft tissue infections, urinary tract infection, conjunctivitis, burn wound infection and bacteremia posing risk for high mortality.[3,4] *Acinetobacter* pneumonia generally occurs in patients with diminished host defenses (e.g. alcoholism, tobacco use, diabetes mellitus, and renal failure, underlying pulmonary disease).[5-7] Outbreak of *Acinetobacter* infections is linked to contaminated respiratory equipments, intravascular access devices,

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bedding materials and transmission via hands of hospital personal.[8] It typically colonizes skin and indwelling plastic devices of the hospitalized patients.[9] MDR strains of *Acinetobacter* isolates are a growing problem and have been widely reported.[10] Most *A. baumannnii* are now resistant to ampicillin, carbenicillin, cefotaxime, and chloramphenicol, with some centers reporting up to 91% of nosocomial *Acinetobacter* resistant to Resistance to tobramycin and amikacin is increasing. Fluoroquinolones, colistin, imipenem, and meropenem may retain activity against nosocomial*Acinetobacter*.[11] Ertapenem, the newest of the carbapenems, has little intrinsic activity against *Acinetobacter*and should not be used.[12]

MATERIAL AND METHODS

This was a Cross-sectional study carried out in Microbiology Department at tertiary health care center during one year period from January 2014-2015. All samples were screened for the Acinatobacter and those samples positive were included into study. Total 96 samples were included into study. The samples were sub-cultured onto blood agar, Mac Conkey's agar, and incubated at 37^{O}C. After 24 hours, Gram staining was done from the colonies, which showed presence of gram-negative cocco-bacilli by microscopy. Further identification was done using bio-chemical tests as per standard operating procedures.7 After identification, antimicrobial susceptibility testing was done by the Kirby- Bauer disk diffusion method to determine the drug resistance, as per CLSI guidelines[16] The isolates were tested against ampicillin, amoxicillinclavulunic acid, ceftazidime, ciprofloxacin, amikacin, cotrimoxazole, piperacillin-tazobactam, imipenem, colistin, and polymyxin B. Isolates showing resistance to at least three categories of drugs i.e. penicillins and cephalosporins, fluroquinolones, and aminoglycosides, were considered multi-drug resistant.[13,14,15] The statistical analysis done by Chi-square test.

RESULT

Table 1: Age-wise distribution of *Acinetobacter*isolates

Age groups	Number of patients (%)
< 5 years	12 (12.5%)
5—20 years	3 (3.125)
20—40 years	38 (39.58)
40—60 years	24 (25.00%)
> 60 years	19 (19.791)
Total	**96 (100.00%)**

The majority of the Patients were from the age group of 20—40 years 39.58% followed by 40—60 years-25.00%; > 60 years-19.791% ;< 5 years-12.5%; 5—20 years-3.125

Table 2: Distribution of *Acinetobacter*isolates in hospital wards

Ward	Number of non-MDR isolates		Number of MDR isolates		Total
ICU	3	9.37%	29	90.63%	32(100%)
General Surgery	2	10.52%	17	89.48%	19(100%)
Obstetrics and Gynecology	3	21.43%	11	78.57%	14(100%)
Orthopedics	1	20.00%	4	80.00%	5(100%)
General Medicine	7	77.77%	2	22.23%	9(100%)
Pediatrics	2	100%	0	0%	2(100%)
Urology	0	0	4	100%	4(100%)
Out patients	4	36.36%	7	63.64%	11(100%)
Total	**22**	**22.91%**	**74**	**77.08%**	**96(100%)**

p< 0.0003; x^2 =29.39, df=8

Majority of the MDR isolates were from Urology-100%followed by; ICU-90.63%; General Surgery-89.48% Orthopedics-80.00%; Obstetrics and Gynecology; 78.57%; Out patients-63.64%.This observed difference is statistically significant (p< 0.0003; x^2 =29.39, df=8).

Table 3: Sample-wise distribution of *Acinetobacter*isolates

Samples	No. of non- MDR isolates		No. of MDR isolates		Total
Pus	6	(15.78%)	32	(84.22%)	38 (100%)
ET aspirate	1	(5.26%)	18	(94.74%)	19 (100%)
Urine	8	(47.05%)	9	(52.94%)	17 (100%)
Sputum	2	(25.00%)	6	(75.00%)	8 (100%)
Blood	1	(16.66%)	5	(83.33%)	6 (100%)
Others	4	(50.00%)	4	(50.00%)	8 (100%)
Total	**22**	**(22.91%)**	**74**	**(77.08%)**	**96 (100%)**

P<0.05, X^2 = 13.53, df= 6

The majority of the MDR isolates were from ET aspirate-(94.74%) followed by Pus-(84.22%); Blood-(83.33%); Sputum; (75.00%); Urine-(52.94%); Others-(50.00%). This observed difference is statistically significant (P<0.05, X^2 = 13.53, df= 6)

Table 4: Comparison of antibiotic resistance pattern of MDR and non-MDR *Acinetobacter*isolates

Drug	Non- MDR (%)		MDR (%)		Total
Ampicillin	18	(19.57%)	74	(80.43%)	92 (100%)
Amoxycillin –clabulanic acid	10	(11.91%)	74	(88.09%)	84(100%)
Ceftazidime	5	(6.33%)	74	(93.67%)	79(100%)
Amikacin	1	(1.76%)	56	(98.24%)	57(100%)
Gentamicin	1	(1.45%)	68	(98.55%)	69(100%)
Co- trimoxazole	2	(2.99%)	65	(97.01%)	67(100%)
Ciprofloxacin	5	(6.33%)	74	(93.67%)	79(100%)
Piperacillin –tazobactam	2	(5.89%)	32	(94.11%)	34(100%)
Imipenem	1	(4.55%)	21	(95.45%)	22(100%)
Total	**22**	**(22.92%)**	**74**	**(77.08%)**	**96(100%)**

$P<0.0004, X^2= 28.72$ df=8.

The majority of the antibiotic resistance pattern of MDR and non-MDR *Acinetobacter*isolates to Gentamicin-98.55% followed by Amikacin-98.24%; Co- trimoxazole-97.01%; Imipenem-95.45%;Piperacillin –tazobactam-94.11%; Ciprofloxacin-93.67%; Ceftazidime-93.67%; Ampicillin-80.43%; Amoxycillin –clabulanic acid-88.09%. This observed difference is statistically significant ($P<0.0004$, $X^2= 28.72$ df=8).

DISCUSSION

Acinetobacter species has emerged as an important pathogen causing life-threatening infections both in community and hospital. Rapid emergence of multidrug-resistant *Acinetobacter* has further made the situation critical.[17] *Acinetobacter* is found ubiquitously in nature, soil and also in skin as commensal. Infection is commonly transmitted through aerosol. Prior use of broad spectrum antibiotics, cross infection by hand of hospital staff, ventilator machine are all potential risk factors for development of multidrug-resistant *Acinetobacter* infection in hospital.[18] In our study we have found that The majority of the Patients were from the age group of 20-40 years 39.58% followed by 4060 years-25.00%; > 60 years-19.791% ;< 5 years-12.5%; 5-20 years-3.125%. Majority of the MDR isolates were from Urology-100%followed by; ICU-90.63%; General Surgery-89.48%. Orthopedics-80.00%; Obstetrics and Gynecology; 78.57%; Out patients-63.64%.This observed difference is statistically significant ($p< 0.0003$; $x^2 =29.39$, df=8). The majority of the MDR isolates were from ET aspirate- (94.74%) followed by Pus- (84.22%); Blood- (83.33%); Sputum; (75.00%); Urine- (52.94%); Others- (50.00%). This observed difference is statistically significant ($P<0.05$, $X^2 = 13.53$, df= 6). The majority of the antibiotic resistance pattern of MDR and non-MDR *Acinetobacter*isolates to Gentamicin-98.55% followed by Amikacin-98.24%; Co- trimoxazole-97.01%; Imipenem-95.45%; Piperacillin–tazobactam-94.11%; Ciprofloxacin-93.67%; Ceftazidime-93.67%; Ampicillin-80.43%; Amoxycillin–clabulanic acid-88.09%. This observed difference is statistically significant ($P<0.0004$, $X^2= 28.72$ df=8).

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