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Original Article

Microbiology Section

Prevalence of *Acinetobacter Sp.* In ICUs and their Antimicrobial Resistance

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ABSTRACT

Introduction: *Acinetobacter Sp.* are ubiquitous aerobic gram negative coccobacilli that are increasingly responsible for a large number of nosocomial infections. It represents severe problems for choosing effective antimicrobials because of the resistance to many available drugs.

Materials and Methods: Specimens collected from ICU patients were cultured and identified as *Acinetobacter Sp.* using standard methods. Antibiotic sensitivity pattern was done using modified Kirby Bauer disc diffusion method

Results: Two hundred and eleven isolates of various bacteria from 200 patients with nosocomial infections were collected and evaluated. A total of 38 (18%) isolates of *Acinetobacter Sp.* were isolated. The prevalence was more among males in all age groups. Multidrug resistance isolate showing resistance to two or more antibiotics was 94.7% (36). Imipenem (60.5%) and Cefaperazone/Sulbactum (50%) showed highest sensitivity. Poor sensitivity was seen with Amikacin (73.6%), Ampicillin (86.8%) and Gentamicin (52.6%).

Conclusion: *Acinetobacter Sp.* is a formidable challenge for managing critically ill people. Continued efforts are needed to develop better antimicrobial policies against this pathogen.

Keywords: Acinetobacter, Nosocomial infections, ICU

INTRODUCTION

Nosocomial infections are important health problems in many countries especially in the intensive care units (ICUs). Nosocomial infections are frequently seen in ICUs because of the frequent use of antibiotics, underlying disease and invasive interventions [1]. *Acinetobacter Sp.* are ubiquitous aerobic gram negative cocco bacilli that are increasingly responsible for a large number of nosocomial infections. It represents severe problems for choosing effective antimicrobials because of the resistance to many available drugs [2].

AIMS AND OBJECTIVES

To study the prevalence of nosocomial infections due to *Acinetobacter Sp.* in ICU and to study its susceptibility to commonly used antimicrobials.

MATERIALS AND METHODS

The study was carried out in the ICU of a tertiary care centre over a six month period. The following variables were analyzed: patients age, sex, and the presence of underlying diseases or conditions, admission to ICU, mechanical ventilation, urinary and intravenous (IV) catheterization, number of hospital days and surgery, if any. The cultures of intravenous catheter tips were done by semi-quantitative method and bacterial growth with 15 or more colonies were considered positive [3]. Secretions from endotracheal tubes, with a gram stain microscopy showing one or more types of bacteria and more than 25 neutrophils per low-power field, were selected for culture and growth. Colony Forming Units (CFUs) 107 were considered as significant [4,5]. Urine specimens containing organisms and pus cells on grams staining and yielding a pure culture of 105 or more CFU/ml, were considered to be significant bactereuria cases [6]. All specimens were initially processed by the routine microbiological laboratory tests to separate the non-fermenters from gram negative bacilli. All the clinical samples were inoculated on Mac Conkey agar and 5% sheep blood agar at 37°C for 24 hours. Urine samples were inoculated into CLED agar [7]. *Acinetobacter Sp.* was identified by non lactose fermenting colonies, non motile, oxidase negative, gram negative coccobacilli and biochemical reactions. Speciation was done on the basis of glucose oxidation, gelatine liquefaction, haemolysis, growth at 35°C and 42°C and assimilation tests [8,9] [Table/Fig-1]. Antimicrobial susceptibility tests were done by Kirby Bauer disk diffusion method with Ampicillin (10µg), Ampicillin/ Sulbactum (10/10µg), Amikacin (30µg), Ceftazidime (30µg),

Cefaperazone/Sulbactum, Ciprofloxacin(5µg), Gentamicin (10µg), Imipenem (10µg), Ofloxacin (5µg), Piperacillin/ Tazobactum , Norfloxacin (10µg), Nalidixic acid (30µg).

RESULTS

A total of 211 isolates of various bacteria from 200 patients with nosocomial infections were collected and evaluated. Majority of the organisms isolated were gram negative bacilli (139) constituting 65.87% of positive cultures. Non fermenters (80) formed 57.5% of gram negative bacilli and 37.9% of total positive cultures. A total of 38 isolates of *Acinetobacter Sp.* were isolated during study period accounting for 18% of total positive cultures [Table/Fig-1].

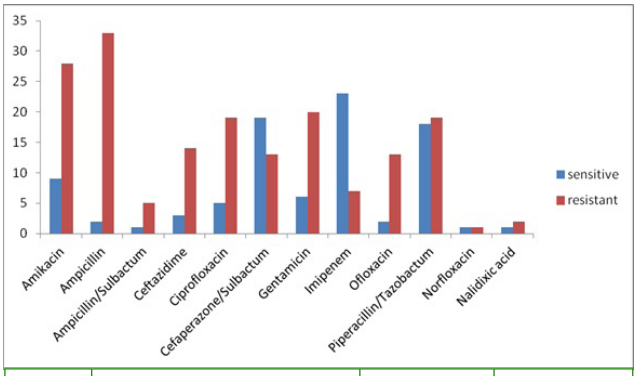
38 isolates of various *Acinetobacter Sp.* were isolated from 200 patients. Among these, ventilator associated pneumonia was most common infection (55.5%) followed by IV catheter related infection (37.5%). The male to female ratio was 3.42:1. The prevalence was more among the males in all age groups. *Acinetobacter* infection was more common in patients above 60 years of age. Most of these patients had chronic illness like COPD, diabetes mellitus, liver or renal failure. In 12.5% of patients organisms with same antibiogram were isolated from multiple sites like tracheal aspirate and blood. In 3 cases there was repeated isolation of the same organism within an interval of 5 days. The isolation of *Acinetobacter* from single site was more in male patients (77.4%). Multidrug resistance isolate showing resistance to two or more antibiotics was 94.7% (36). Only 2 isolates were sensitive to all antibiotics. In this study Imipenem (60.5%) and Cefaperazone/Sulbactum (50%) showed highest sensitivity. Poor sensitivity was seen with Amikacin (73.6%), Ampicillin (86.8%) and Gentamicin (52.6%) [Table/Fig-2].

DISCUSSION

Acinetobacter Sp. has emerged as an important nosocomial pathogen that is often multidrug resistant and associated with life threatening infections [2]. A. baumannii especially has a tendency towards cross transmission particularly in ICUs, where numerous outbreaks are encountered [2]. In our study period of six months 38 (18%) isolates were obtained from 211 clinical specimens. This percentage may be high due to better identification schemes and more indiscriminate use of antibiotics in the hospitals today. *Acinetobacter* infection was more common in patients over 60 years of age and in male patients. All the patients had some underlying diseases. They were admitted to ICU for some acute illness and were on prior antibiotic treatment. So the hospital stay, debilitated state of health and exposure to antibiotics may have pre-disposed for *Acinetobacter* infection. This is consistent with the study done by Siegman Igra et al., [10]. Prior use of antibiotics, underlying infections and invasive procedures like catheterisation, intravenous fluids or ventilator support were risk factors for development of multidrug resistant *Acinetobacter* infection. This is similar to the studies done by Siegman Igra et al., [10] and Jose M Cisneros et al., [11].

Specimen	Total	Non fermenters	Acinetobacter
Blood	42	04 (9.52%)	3 (7.14%)
Urine	36	09 (25%)	2 (5.55%)
Exudate Pus/ swabs	15	05 (33.3%)	4 (26.6%)
Sputum	30	10 (33.3%)	4 (13.3%)
Tracheal aspirate	09	09 (100%)	5 (55.5%)
CSF	12	01 (16.6%)	1 (8.3%)
IV Catheter tip	24	13 (54.16%)	9 (37.5%)
Suction tip	20	10 (50%)	4 (20%)
ET tip	12	7 (58.3%)	4 (33.3%)
Central line tip	11	3 (27.2%)	2 (18.1%)
Total	211	80	38

[Table/Fig-1]: Prevalence of non fermenters & acinetobacters



S. No.	Antibiotics	Sensitive	Resistant
1	Amikacin	9 (23%)	28 (73.6%)
2	Ampicillin	2 (5.2%)	33 (86.8%)
3	Ampicillin/ Sulbactum	1 (2.6%)	5 (13.1%)
4	Ceftazidime	3 (7.8%)	14 (36.8%)
5	Ciprofloxacin	5 (13.1%)	19 (50%)
6	Cefaperazone/ Sulbactum	19 (50%)	13 (34.2%)
7	Gentamicin	6 (15.7%)	20 (52.6%)
8	Imipenem	23 (60.5%)	7 (18.4%)
9	Ofloxacin	2 (5.2%)	13 (34.2%)
10	Piperacillin/ Tazobactum	18 (47.3%)	19 (50%)
11	Nalidixic acid	1 (2.6%)	2 (5.2%)
12	Netillin	7 (18.4%)	0
13	Norfloxacin	1 (2.6%)	1 (2.6%)

[Table/Fig-2]: Antibiotic sensitivity pattern

Among clinical isolates it has been evident that one of the striking features of the genus is the ability to develop antibiotic resistance extremely rapidly in response to challenge with new antibiotics [12]. Many *Acinetobacter* are now sensitive to clinically achievable levels of most commonly used antibiotics. Imipenem remains the most active drug until recently. In our study however 60.5% of the strains were sensitive to Imipenem. This is comparable to the studies done of hospital outbreak of Imipenem resistant strains [13]. Differences in antibiotic susceptibility have been observed between countries probably as a result of environmental factors and different patterns of antimicrobial usage. It was observed that the isolates were sensitive to Cefaperazone-Sulbactum combination. This may be due to the intrinsic activity of Sulbactum against *Acinetobacter Sp.*. regrettably the possible use of Sulbactum combinations in multidrug resistant *Acinetobacter* hospital outbreaks may only be short lived since resistance has already been observed and will probably increase rapidly if these antimicrobials are used often.

CONCLUSION

Acinetobacter Sp. is a formidable challenge to managing critically ill people. Injudicious use of antibiotics, mechanical ventilation, and cross infection are potential risk factors for the development of *Acinetobacter* infection. Continued efforts are needed to develop better antimicrobial policies against this pathogen.

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