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RESEARCH ARTICLE

Antimicrobial Resistance Pattern of Acinetobacter Baumannii Infection: A Comparative Study in Indoor and Outdoor Patients.

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ABSTRACT:

Acinetobacter baumannii is a ubiquitous pathogen that has emerged in the last few decades as a major cause of healthcare-associated infections and nosocomial outbreaks. Increasing antimicrobial resistance has been documented in the past few decades. Multidrug-resistant Acinetobacter baumannii is recognized to be among the most difficult antimicrobial-resistant gram-negative bacilli to control and treat. This retrospective study was planned to study the incidence of Acinobacter baumannii infection and the antimicrobial resistance pattern among the indoor and outdoor patients. Out of a total of 6315 infected samples,1004 were positive for Acinetobacter baumannii. Isolation was maximum in pus, followed by sputum and endotracheal tube aspirate. When antibiotic susceptibility was examined, the highest susceptibility was to Imepenam in the outpatients and to Imepenam and Nitrofurantoin in the inpatients. The result also demonstrates that the inpatients samples were more resistant to antibiotics as compared to outpatients. This emphasizes the need for periodical surveillance studies.

KEY WORDS: Antimicrobial resistance, Acinetobacter baumannii, indoor patients, outdoor patients

INTRODUCTION:

Acinetobacter is aerobic gram-negative coccobacillus . It enters into the body through open wounds, catheters, and breathing tubes. During the past three decades it has emerged from an organism of questionable pathogenicity to an infectious agent of importance to hospitals worldwide[1].

It usually infects those with compromised immune systems, such as the wounded, the elderly, children or those with immune diseases. Colonization poses no threat to people who aren't already ill, but colonized health care workers and hospital visitors can carry the bacteria into neighboring wards and other medical facilities[2].

The number of nosocomial infections (hospital-acquired infections) caused by A. baumannii has increased in recent years; as have most other nosocomial pathogens (MRSA, VRSA, VRE, etc.)[3].

Nosocomial A. baumannii bacteremia may cause severe clinical disease that is associated with an elevated mortality rate[4]. This opportunistic pathogen expresses a myriad of factors that could play a role in human pathogenesis. Among these factors are the attachment to and persistence on solid surfaces, the acquisition of essential nutrients such as iron, the adhesion to epithelial cells and their subsequent killing by apoptosis, and the production and/or secretion of enzymes and toxic products that damage host tissues. Besides these the most important is that the organism has ability to accumulate diverse mechanisms of resistance.

Recently, multidrug resistance in A. baumannii has been reported as 30% [5].While carbapenem antibiotics are usually considered standard treatment for such infection, as resistance rates rise, alternatives must be found.

Keeping the above facts in view the present study was planned to study the prevelance, sensitivity and resistance pattern of Acinetobacterbaumannii in our hospital and also to see whether there is difference in antimicrobial resistance pattern between indoor and outdoor patients;

MATERIAL AND METHODS:

This retrospective study was conducted in the department of pharmacology and microbiology, SRMSIMS, Bareilly. Isolates of Acinetobacter from all the submitted clinical specimens during the period 01-08-2008 to 31-07-2010 were analyzed. The data for the study was obtained from microbiology department and were analyzed for the prevalence and sensitivity pattern of Acinetobacter. Samples had been received from inpatients and outpatients of various departments. Acinetobacter was identified by conventional method.

The antimicrobial Sensitivity test was done by the disc diffusion method, a modification of Bauer et al. method (1966). The different antimicrobial agents used were Ampicillin, cephalexin, ceftriaxone, cefpodoxime,

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ceftizidime, gentamicin, amikacin ,tobramycin, netilmicin, ciprofloxacin, nitrofurantoin, Gatifloxacin, azithromycin, doxycycline, Cefoperazone+ sulbactum, piperacillin, piperacillin + tazobactum, imepenam, meropenam, ticarcillin + clavulinic acid and cefepime.

In reporting the results, resistance to any antibiotic was represented by R, while S represented sensitivity of the organism to the antibiotic.

RESULTS:

A total of 15889 specimens were received over the two years period, out of which 5779 were from outpatients, 9293 were from inpatients and 817 samples were from outside. All the collected samples were processed in the bacteriology laboratory. 6315 samples were found to be pathogenic and amongst these 1004 were positive for Acinetobacter.

The incidence of Acinetobacter in different specimen is shown in table 1. Isolation of Acinetobacter was maximum in pus, followed by sputum and endotracheal tube aspirate. On frequency analysis highest isolation was in ET tube aspirate followed by ascites, Pleural fluid and blood culture (figure.1).

Most common presentation of the inpatients who showed positive Acinetobacter infection, was pneumonia. While amongst the outpatients it was infected wound.

When antibiotic susceptibility was examined, the highest susceptibility was to Imepenam in the inpatients and to Imepenam and Nitrofurantoininm in the outpatients. [figure.2& 3].The results also demonstrates that the inpatients specimens were more resistant to antibiotics as compared to outpatients.. Since tigecycline and colistin were not available in our country during that time, sensitivity for these two drugs was not investigated. Most of the samples were resistant to all the first line antibiotics. Maximum resistance was seen with Azithromycin, Ciprofloxacin and ampicillin, on the other hand maximum sensitivity was seen with Meropenam, Imepenam and Cefoperazone + sulbactum. (Fig. 2 and 3).

Table 1: Incidence of Acinetobacter in different specime

Sample	Total no.	No. of Acinetobacter
Urine	1649	31
Blood culture	291	64
Sputum	1644	201
Pus	1661	255
ET tube aspirate	952	432
CSF	22	02
Ascitic fluid	08	02
Pleural fluid	12	03
Vaginal swab	111	09
Eye swab	26	01
Bal/ BR wash	27	04

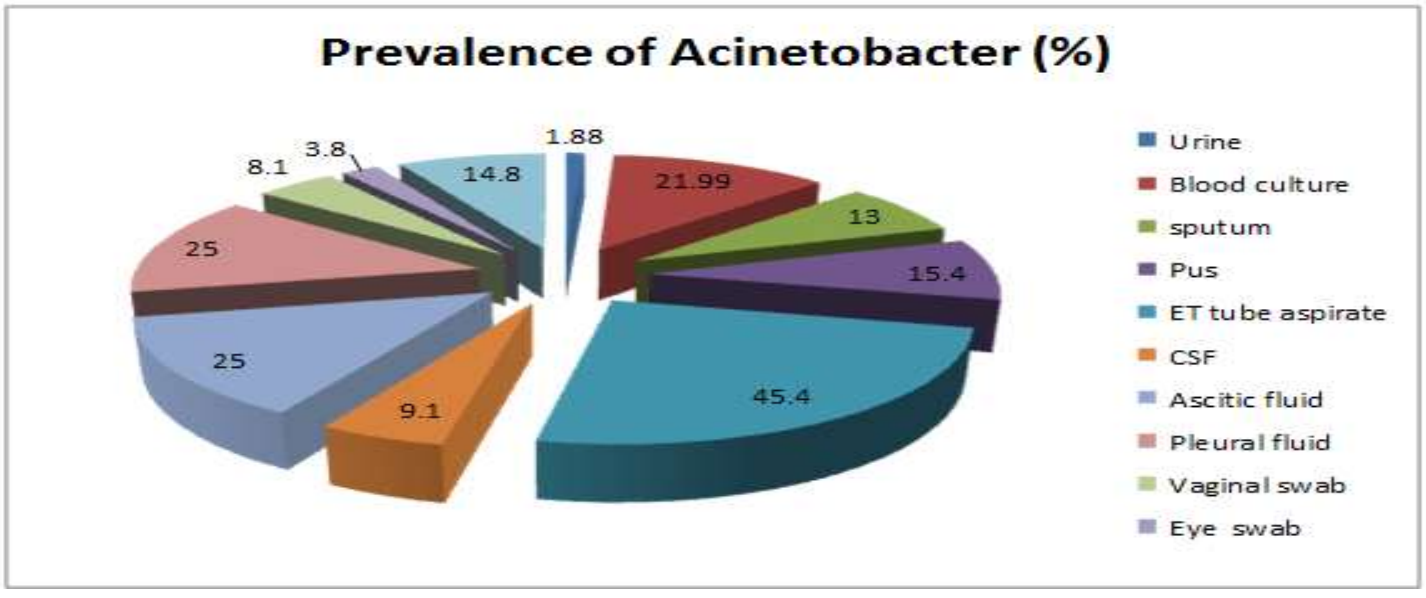


Figure 1: Frequency distribution of Acinetobacter in different specimen

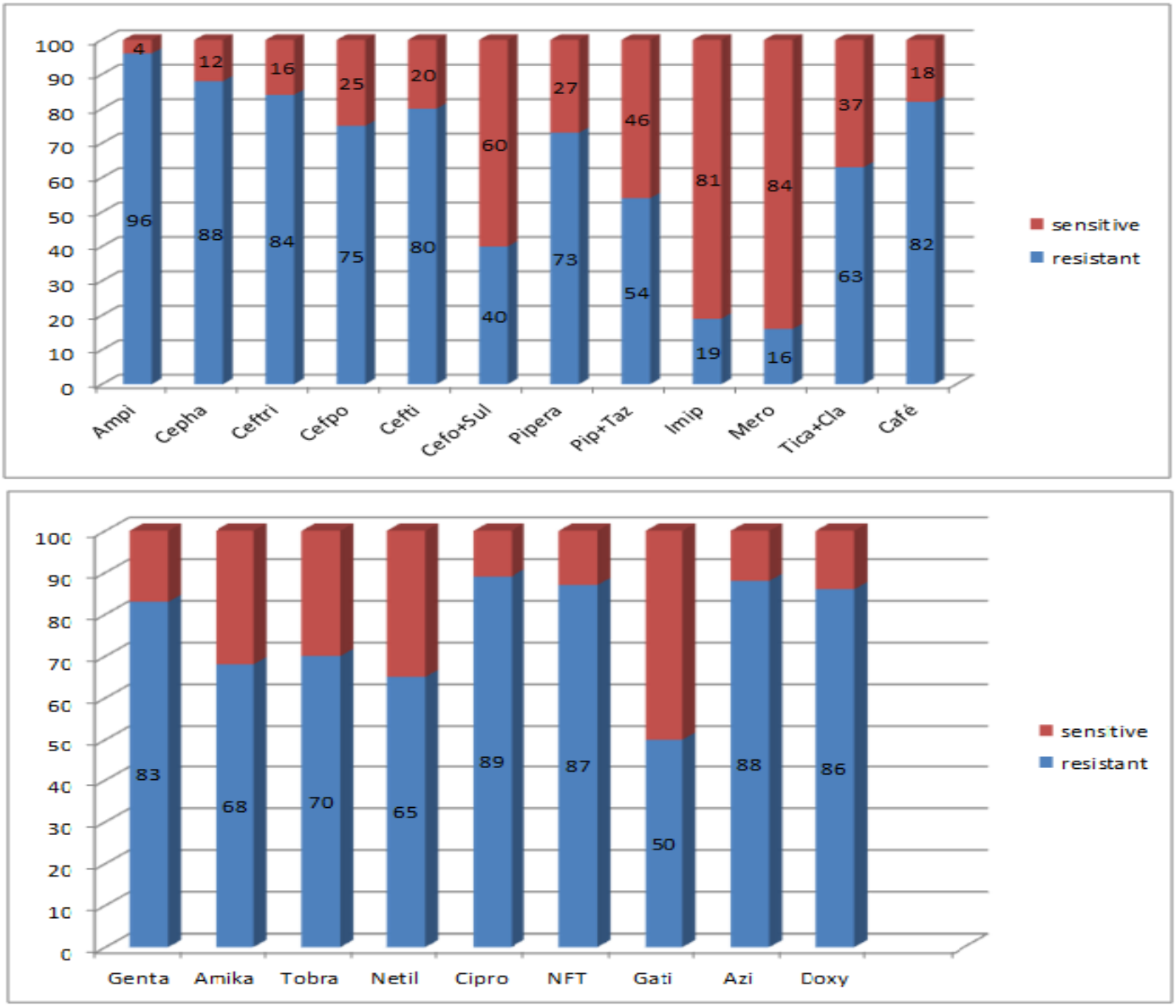
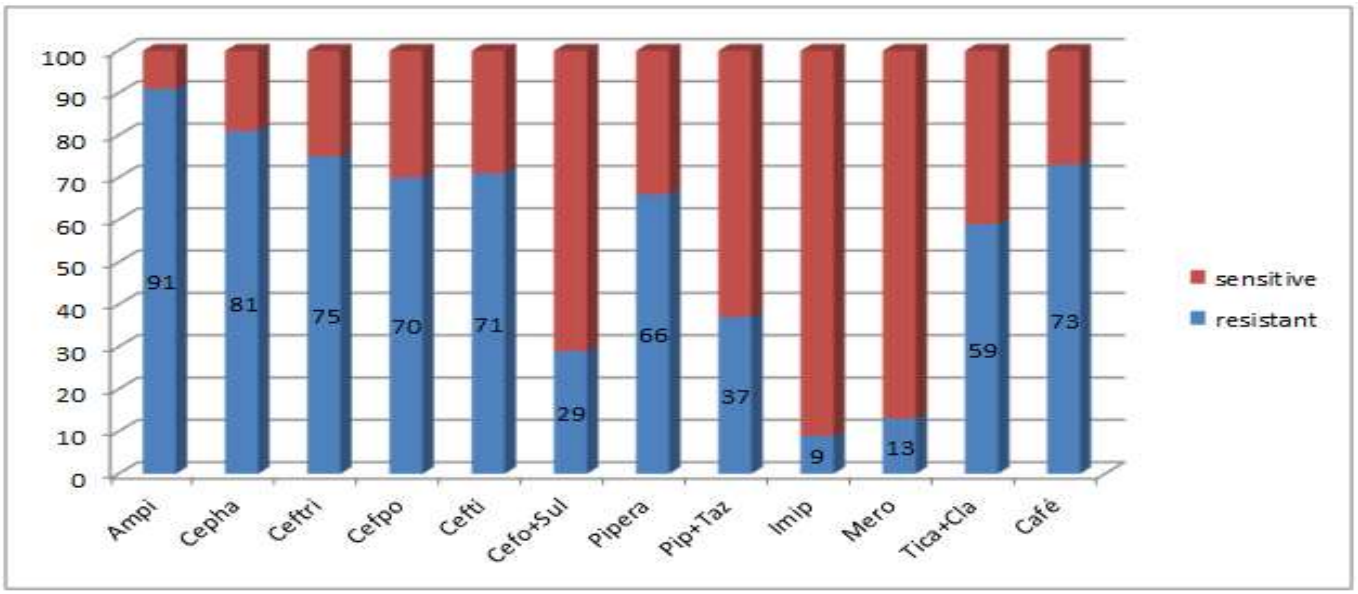


Figure 2: Antibiotic resistant pattern (%) of Acinetobacter in inpatient department



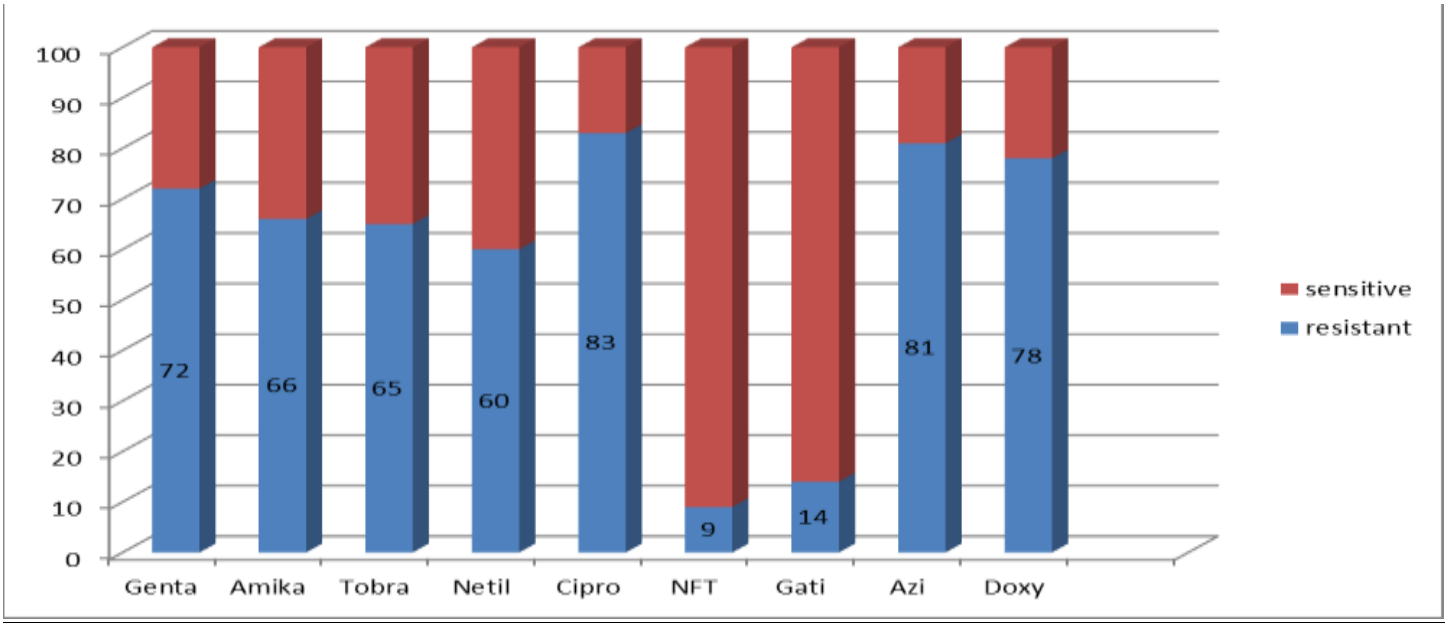


Figure 3: Antibiotic resistant pattern of Acinetobacter in outpatient department

DISCUSSION:

Acinetobacter baumannii has become an important pathogen in recent years and has been shown to increase morbidity and mortality [6-8]. The definition of Multi drug resistant Acinetobacter baumannii (MRAB) varies in the literature, but several authorities consider an isolate to be multidrug resistant if it is resistant to three or more classes of antibiotics [9]. Resistant Acinetobacter infection is a significant problem as seen in the present study where 87% of isolates were considered multidrug resistant and 2.7% were resistant to imipenem, meropenam, and 6.8% to cefoperazone-sulbactam, formerly very effective antibiotics. Nearly half of all isolates were resistant to all commonly used antibiotics including aminoglycosides, cephalosporins, carbepenems, extended spectrum penicillins, and quinolones. In a study previously performed in Turkey, the susceptibility of imipenem in Acinetobacter spp. strains between 1994 and 1995 was 100%, which was then reduced to 35% between 2003 and 2004[9]. In another study in Turkey, performed on ventilator associated pneumonja VAPs caused by Acinetobacter spp. strains, resistance to ceftazidime, imipenem and ciprofloxacin was determined to be 60, 64 and 80%, respectively, and the most susceptible antibiotic was cefoperazone-sulbactam[10]. In the MYSTIC Study that investigated the antimicrobial sensitivities of the nosocomial Gram negative pathogens, 67% of the A.baumannii strains were found multi-drug resistant and the sensitivity to carbapenem, tobramycin, cefepime, ciprofloxacin and ceftazidime were detected to be 53%, 44%, 37%, 29% and 22%, respectively[11]. Most of the researchers have done this type of study in either hospital acquired infection or in ICU patients. In our study antimicrobial sensitivity is more as compared to the above mentioned studies because it includes samples from both indoor and outdoor patients.

In conclusion, resistance development for commonly used antibiotics against Acinetobacter strains has increased in last 5-10 years. Resistance in our hospital is significant in Acinetobacter spp. Regular surveillance of nosocomial infections and adopting basic infection control practices that have been shown to prevent healthcare associated infections are very important steps towards the reduction of these infections. In addition, there is a need to emphasize on the rational use of antimicrobials and strictly adhere to the concept of "reserve drugs" to minimize the misuse of available antimicrobials. Therefore, restricted antibiotic policies, antibiotic cycling and shorter antibiotic usage may be effective in reducing antibiotic resistance.

LIMITATIONS:

1. This is a retrospective study, so many relevant patient details could not be gathered.

2. No facility for testing sensitivity to colistin and tigecycline

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