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Microbiology

ANTIBIOTIC PROFILE OF ACINETOBACTER BAUMANNII IN TERTIARY CARE HOSPITAL, VADODARA, GUJARAT, INDIA.

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ABSTRACT Acinetobacter baumannii is one of the most important bacteria in Hospital-acquired infections. Antibiotic resistance in this bacterium leads to many problems in treating patients. This prospective study was conducted on 80 isolates of Acinetobacter baumannii collected from clinical samples in the Microbiology Department, Smt. B. K. Shah Medical Institute and Research Center, Vadodara. The antibiotic resistance pattern was determined by the VITEK 2 automated machine. Out of 80 isolates, the highest rate of sensitivity was seen in Minocycline (50 %). The occurrence of infection was more common in males than females. Isolation of bacterium was more from pus samples than other samples. So the study was conducted to demonstrate the burden of micro-organisms in hospitals and their antibiotic sensitivity pattern.

KEYWORDS : Acinetobacter Baumannii, Antibiotic Sensitivity Pattern.

INTRODUCTION:

Acinetobacter baumannii is a strictly aerobic, nonmotile, Gram-negative, lactose nonfermenting, oxidase-negative, and catalase-positive bacterium. Within hospital settings, *Acinetobacter baumannii* has become a common pathogen, which can infect the respiratory tract, blood, soft tissues, and urinary tract of a person. It is the causative agent of nosocomial infections leading to septicemia, meningitis, endocarditis, pneumonia, wound, and urinary tract infections [1, 2]. There are 32 *Acinetobacter* named and unnamed species, which have been identified [3]. *Acinetobacter* species lead to infections, which are associated with increased morbidity and mortality rates [4, 5]. Despite the fact that the pathogen is often hospital-associated, initial infection can be transmitted by patients, admitted from other hospitals [6, 7]. About 25 years ago, *A. baumannii* was found to be resistant to antimicrobial agents, such as aminopenicillins, cephalosporins, first- and second-generation cephalosporins, cephamycins, aminogly cosides, ureidopenicillins, chloramphenicol, and tetracyclines. Strains of *A. baumannii* have started to acquire resistance against newly developed antimicrobial agents and have become prevalent in many hospitals [8]. More recently, the term "extensively drug-resistant" *A. baumannii* (XDRAB) is used to denote bacterial isolates resistant to all authorized antibiotics except two categories of antibiotics such as tigecycline and polymyxins [9]. The risk of *A. baumannii* infection from hospitalized patients is based on some important factors, such as bacterial colonization, medical staff-to-patient ratio, and other ward characteristics [10]. The current study was conducted to determine the prevalence of *A. baumannii* and its antibiotic profile in Dhiraj Hospital that is associated with Smt. B. K. Shah Medical Institute and Research Centre, Vadodara.

MATERIALS AND METHODS:

This prospective study was done in a tertiary care hospital in Vadodara during the period of January- June 2023. 80 non-duplicate *Acinetobacter baumannii* were recovered from samples such as urine, pus, sputum, wound swabs, ear swabs, blood, and endotracheal aspirate from various departments of Smt. B. K. Shah Medical Institute and Research Centre (Table 1). The clinical samples were inoculated by streak plate method on nutrient agar (Himedia, Mumbai, India), Mac Conkey agar (Himedia, Mumbai, India), and blood agar (Himedia, Mumbai, India). Blood was inoculated in the BACTEC automated machine and positive cultures were plated on blood agar, Mac Conkey agar, and nutrient agar. The isolated colonies on the different media were identified based on the morphology of the colony, Gram staining, and oxidase test, and confirmed identification was done in a VITEK 2 automated machine. VITEK 2 also gave us an antibiotic profile of the bacterium in all samples. All the media, oxidase disc, and Gram staining kits were purchased from Himedia, Mumbai, India.

RESULTS:

80 *Acinetobacter baumannii* were isolated from 221 different samples. The prevalence rate of the organism was found to be 36.20%.

Table 1: Gender-wise distribution of *Acinetobacter baumannii* isolates:

Gender	No. of isolates (%)
Male	56 (70%)
Female	24 (30%)
Total	80 (100%)

Table 1 shows that among *80 Acinetobacter baumannii* isolates, 56 (70%) were from males and 24 (30 %) from females.

Table 2: Distribution of isolates according to type of specimen:

Type of specimen	No. of isolates (%)
Pus	26 (32.5%)
Sputum	17 (21.25%)
Urine	2 (2.5%)
ET secretion	19 (23.75%)
CSF	2 (2.5%)
Blood	12 (15%)
Ascitic fluid	1 (1.25%)
Pleural fluid	1 (1.25%)
Total	80 (100 %)

Table 2 shows that out of 80 isolates, 26 (32.5 %) of the isolates were from Pus, 19(23.75 %) were from ET secretion, 17(21.25 %) were from sputum, 12 (15 %) were from blood, 2 (2.5 %) were from urine and CSF each, 1 (1.25 %) were from ascitic fluid and Pleural fluid each.

Table 3: Distribution of isolates according to Department of hospital from where the sample has been received:

Department of Hospital	No. of isolates
ICU	50 (62.5%)
Surgery	10 (12.5%)
Medicine	8 (10%)
Orthopedics	3 (3.75%)
Obstetrics and Gynecology	1 (1.25%)
Casualty	5 (6.25%)
Skin	1 (1.25%)
Paediatrics	1 (1.25%)
Chemotherapy	1 (1.25%)
total	80 (100%)

Table 3 shows that 50 (62.5 %) of strains were isolated from the samples sent from ICU followed in decreasing order by 10 (12.5%) from Surgery Department, 8 (10%) from Medicine Department, 5 (6.25%) from Casualty, 3 (3.75 %) from Orthopedic Department, 1 (1.25%) from Paediatric Department, Skin, Chemotherapy, Obstetric and Gynecology Department each.

Table 4: Distribution of isolates according to their Antibiotic sensitivity pattern:

Antibiotic	Short form	No. of isolates (sensitive)	Percentage
PIPERACILLIN/TAZOBACTAM	PIT	16	20%
CEFTAZIDIME	CAZ	11	13.75%
CEFOPERAZONE/SULBACTAM	CFS	24	30%
CEFEPIME	CPM	12	15%

IMIPENEM	IPM	11	13.75%
MEROPENEM	MRP	16	20%
AMIKACIN	AK	17	21.25%
GENTAMICIN	GEN	22	27.5%
CIPROFLOXACIN	CIP	11	13.75%
LEVOFLOXACIN	LE	14	17.5%
MINOCYCLIN	MI	40	50%
TIGECYCLINE	TGC	15	18.75%
COLISTIN	CL	1	1.25%
TRIMETHOPRIM/SULPHA METHOXAZOLE	COT	21	26.25%
Total		80	

Table 4 shows that out of 80 *Acinetobacter baumannii* isolates, 40 isolates are most sensitive to Minocyclin (50%), followed in decreasing order by Cefoperazone/Sulbactem (30%), Gentamicin (27.5%), Trimethoprim/Sulphamethoxazole (26.25%), Amikacin (21.25%), Meropenem (20%), Pipercillin/Tazobactam (20%), Tigecycline (18.75%), Levofloxacin (17.5%), Cefepime (15%), Ceftazidime (13.75%), Imipenem (13.75%), Ciprofloxacin (13.75%), Colistin (1.25%), Aztreonam and Fosfomycin (0%). 92.5 % isolates were found to be multidrug resistant.

DISCUSSION:

Acinetobacter baumannii is one of the most common cause of hospital-acquired infections among Gram-negative bacteria. Widespread use of antimicrobials has resulted in the emergence of multidrug-resistant isolates among these micro-organisms. Multiple drug resistance (MDR) is the resistance exhibited by a microorganism to at alteast one antibiotic in three or more antibiotic categories. In our study, out of 80 isolates, 74 (92.5 %) isolates are MDR. The high proportion of multidrug-resistant *A. baumannii* has been reported in other studies globally with major impact reported in Asian countries including Malaysia, India, and Pakistan [11,12,13]. It causes infections frequently in clinical settings, especially in surgical wards and ICUs, and the resistance patterns in different geographical areas. Hence antibiotic surveillance is of prime importance to the policy makers to frame the empirical treatment strategy for these bacterial infections. The prevalence of isolation was higher from ICU and surgery Department samples which is comparable to studies done by Santosh Kumar Yadav et al [14] and George et al [15]. *Acinetobacter baumannii* occurrence was predominant in males (70 %) in our study which is higher than the study done by Santosh Kumar et al [14]. In this study, the frequency of *Acinetobacter baumannii* was predominant in pus (32.5 %) than in other specimens which was similar to studies of Aroma et al and Mishra et al [16,17]. In the present study, the Prevalence rate of *Acinetobacter baumannii* was 36.20 % which is comparable to the study done by Anthony et al [18]. In our study, the isolates are most sensitive to Minocycline (50 %). Recently use of Minocycline for the treatment of *Acinetobacter Baumanii* has increased due to its high susceptibility [19].

CONCLUSION:

Acinetobacter baumannii is one of the most common nosocomial pathogens and extensive use of antimicrobial agents has led to the emergence of multidrug-resistant isolates in hospital settings particulary its incidence is high in ICU patients and patients of surgery Department. This may be due to prolonged stay in hospital. Infection with *Acinetobacter Baumannii* is more common in males than females. Minocycline is one of the most active agent for the treatment of *Acinetobacter* infections.

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