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Multidrug resistance pattern of *Acinetobacter baumannii* causing nosocomial infections isolated from different clinical specimens.

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ABSTRACT:
Background: Acinetobacter species are the key pathogens causing infection persisting in the hospital environment. Hospital acquired infections caused by *A. baumannii* are far more common and of a great concern as its ability to develop resistance towards a wide variety of antimicrobials. The present study aims to determine the MDR pattern in A. baumannii. **Methodology:** The antibiotic susceptibility/sensitivity tests were employed to determine the MDR in A. baumannii. **Results:** A total of 172 samples *A. baumannii* were analyzed from various clinical specimens. Majority of them were from sputum (29.65%) followed by wounds (15.69), urine (15.11), blood (10.46), catheter (8.13), ulcers (6.39) and 14.53 from other body fluids. Significant susceptibility and sensitivity was shown for Tetracycline (75.58%; 24.42%) followed Ampicillin (68.60%; 31.40%), Cotrimaxazole (68.02%; 31.98%), Chloramphenicol (55.82%; 44.18%), Nalidixic acid (52.32%; 47.68%), Ciprofloxacin (43.02; 56.98%), Ofloxacin (25%; 75%), Amoxicillin (20.93; 79.07%), Gentamycin (18.02%; 81.98%) and Amikacin (1.16%; 88.84%) respectively. However, *A. baumannii* showed 0% resistance and 100 % sensitivity to Ceftriaxone and Cefuroxime. **Conclusion:** A baumannii is completely sensitive to Ceftriaxone and Cefuroxime and highly susceptible to Tetracycline, Ampicillin, Co-trimaxazole and Chloramphenicol which suggest multidrug resistant nature of A. baumannii, hence our findings suggest that prevention and control strategies needs to be strengthened to overcome the spread of nosocomial infections

Key words: *A. baumannii*; Ceftriaxone; Cefuroxime; MDR; Nosocomial infections.

I. INTRODUCTION:

Acinetobacter spp. emerged worldwide since it was the major cause of morbidity and mortality. Accordingly, *Acinetobacter spp.* was described as an important opportunistic pathogen responsible for severe nosocomial infections. Due to its increasing occurrence and frequent incidence as nosocomial infection, *Acinetobacter spp*. became as a nosocomial pathogen on a global scale. The Infectious Disease Society of America (IDSA) identified *Acinetobacter baumannii* (Fig. 1) among the most common seven pathogens threatening the health – care delivery system. In other statistical studies of European hospitals, *Acinetobacter baumannii* was among 2 % - 10 % of all grams – negative bacterial infections in intensive ICU. The clinical impacts of *Acinetobacter* infections relay on the various risk factors. First factor, infections are related to the use of medical devices (such as endotracheal tubes, intravascular and urinary catheters). Second factor, threatened patients are exposed to broad – spectrum of antibiotics. Third factor, it is responsible for a number of systemic infections in critically ill and immune compromised patients, especially among those in ICU (Jones et al., 2004). The majority of outbreaks caused by *Acinetobacter* have involved respiratory tract infections. There are at least 30 different *Acinetobacter spp*. Which are commonly associated with human infections including *A. baumanni*, *A. calcoaceticus*, *A. haemolyticus*, *A. johnsonii*, *A. jujnii*, *A. lowffii*, and *A. radio resistens.* However , *A. baumannii* is now recognized as the most clinical isolate from nosocomial infections with epidemic potential and identified as a major cause of outbreaks or sporadic cases with high mortality rates accounting for about 8% of reported infections worldwide (Fournier 2006; Falagas et al., 2007) . Threats and hazards of *A. baumannii* infections had been intensively raised worldwide since treatment of *A. baumannii* infection has become difficult (Giamarellou et al., 2008). Many strains are resistant to a wide range of antimicrobials, including broad – spectrum beta – lactams, aminoglycosides, fluoroquinolones, carbapenems and third – generation cephalosporin, and thus recognized as the most important risk factor for multi resistant bacteria (Boo et al., 2009). While community – acquired Acinetobacter infections are rare, hospital

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– acquired infections are far more common and of a greater concern. Infections are associated with immune compromised patients, with infection rates often being highest in intensive care units (ICUS) and surgical wards. Commonly the organisms cause pneumonia, particularly associated with mechanical ventilation and bloodstream infections following invasive procedures (Peleg et al., 2008). The number of multidrug – resistant *A. baumannii* has been increasing worldwide in the past few years (Li, 2006). Therefore the selection of empirical antibiotic treatment is very challenging (Towner, 2009). Generally, Acinetobacter spp. have intrinsic resistance to antimicrobial agents and are pose multi – resistant to certain antibiotics on exposure. Both resistant and multi resistant strains have emerged as a serious problem in many hospitals worldwide. The emergence of multidrug- resistant (MDR) *Acinetobacter spp*. as one of the most important nosocomial pathogens in intensive care unit (ICU) patients has been observed worldwide. Previously, it has been demonstrated that the increase in nosocomial infections caused by *Acinetobacter baumannii* mainly in the respiratory tract, has paralleled with development of resistance rate. Therefore the understanding of the characteristics of *Acinetobacter baumannii* prevalence and antibiogram of its pathogenesis is need of the hour. The present study aims to determine multidrug resistance in *A. baumannii.*

Fig.1. *A. baumannii* (Gram stained)

II. MATERIAL & METHODS

Source of data

The study was conducted at the Department of Microbiology, Sri Siddhartha medical college and Research Centre Tumkur, (Karnataka) and the Department of Microbiology, MGR College, Hosur, Tamilnadu.

Inclusion Criteria

The suspected cases of all the ages from both male and female for the culture and sensitivity test.

Exclusion Criteria

Patients show growth with other than Acinetobacter.

Media

The media used for cultures as well as biochemical testing were supplied by Hi Media, India. The media such as nutrient agar, nutrient broth and triple sugar iron (TSI). Muller Hinton agar and Muller Hinton broth.

Nutrient agar medium was prepared by dissolving 11.2 g nutrient agar powder in 1 L. Distilled water and autoclaving for 15 minutes at 121 ° C. Clinical isolates were routinely sub cultured on nutrient agar plates and incubated at 37 ° C for 18-24 hrs. For bacterial culture maintenance nutrient agar slants were prepared by single straight line inoculation on the surface of the slope in universal bottles and then incubated at 37 ° C for 18-24 hrs.

Triple sugar iron agar (TSI) was dissolved 65 g TSI agar powder in IL distilled water, dispensed into tubes autoclaved at 121 ° C for 15 minutes dispensed in sterile test tube and cooled in a slanted position so that deep butts are formed . Using a sterile needle, an isolated colony on plated media was inoculated by stabbing into the medium in the butt of the tube and then streak back and forth along the surface of the slant. Several colonies from each primary plate were studied separately, since mixed infections may occur. Inoculated TSI tubes were incubated with caps loosened at 37°C and examined after 18-24 hours for carbohydrate fermentation, gas production and hydrogen sulphide production.

The triple sugar iron slants with a butt were prepared and the test isolates were stabbed in the butt and streaked over the slants. The tubes were incubated at 37 ° C for 24 hrs. The crescent shaped blackening of the medium indicates the formation of H_2 S, which was recorded as positive.

Bacterial cultures maintenance

Short – duration working stocks (few weeks) were maintained on slants at room temperature (25°C) . For long – term preservation, heavy nutrient broth media with 20 % v / v glycerol was stored at -70 ° C until nutrient agar suspension in use. Bacterial strains were revived by streaking aliquots on appropriate media and incubating at 37°C.

Antibiotic sensitivity test

Kirby – Bauer's disc diffusion method (Bauer A.W 1966) as per the National Committee for Clinical Laboratory Standard guidelines (NCCLS2002) was employed to study the susceptibility pattern of the confirmed isolates against a panel of selected antimicrobial agents. Ampicillin , Chloramphenicol , Co – trimaxazole , Tetracycline , Ceftriaxone , Cefuroxime , Ciprofloxacin , Ofloxacin , Nalidixic acid , Amikacin , Gentamycin and Amoxicillin.

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Preparation of media

Sterility checked Muller – Hinton agar medium and Muller – Hinton broth will be employed

Preparation of inoculum

The 24 hours old, 4-5 well isolated colonies will be inoculated into 5 ml of Muller Hinton broth and incubated at 37 ° C for 6 hours till light to moderate turbidity developed. The turbidity was developed to match with 0.5 Mac Farlands Standard.

The Mueller – Hinton agar sterile plates will be inoculated with the standardized inoculum of test isolate by a sterile cotton swab dipped into the inoculum tube and rotated firmly against the upper inside wall of the test tube to remove excess fluid. The entire surface of Mueller – Hinton agar plate will be streaked with this swab by lawn culture method.

Antibiotic discs

After the inoculum is dried, commercially obtained panel of antibiotic discs will be placed aseptically with a sterile forceps or a dispenser onto the surface of the seeded plate at least 30 mm apart. The discs are pressed gently to ensure even contact with the medium. Five antibiotic discs are accommodated in a single petridish. All the plates will be incubated for 16-18 hours at 37°C.

Control

The antimicrobial susceptibility pattern of the reference culture *E. coli* ATCC 25922 and *Salmonella typhi* NCTC – 786 are used as control.

Reading of zones of inhibition:

After the completion of period of incubation, the diameter of the zone of inhibition around the disc is measured.

Interpretation:

Zone of diameter interpretative standards are used as recommended by the National Committee for Clinical Laboratory standards (NCCLS2002). The respective isolate will be recorded as sensitive, intermediate and resistant to antibiotics used.

Determination of MIC

Micro broth dilution method as per NCCLS guidelines was employed to determine Minimum Inhibitory Concentration of the representative Salmonella typhi strains against Ampicillin (AMP) , Chloramphenicol (CHO) , Co – trimaxazole (COT) , Tetracycline (TRC) , Ceftriaxone (CFT) , Cefuroxime (CFX) , Ciprofloxacin (CFC) , Ofloxacin (OFC) , Nalidixic acid (NAD) , Amikacin (AMK) , Gentamycin (GTM) and Amoxicillin (AMX) selected drugs . In all thirty representative strains from among the confirmed isolates were considered sensitive, intermediate and resistant strains of ten each were selected based on the nearest range of sensitivity and resistance. As per the NCCLS guidelines the MIC range was taken to prepare the highest dilution factor and two – fold dilution were made in a series of 15 of 5 ml test tubes.

Preparation of stock solution

The highest range of all the drugs used in general was 512 µg / ml. 1024 mg pure form of drug was dissolved in 1000 ml suitable diluents to obtain 1024 µg / ml.

Preparation of inoculum

The confirmed isolates of *A. baumannii* were inoculated in 5 ml of sterile nutrient broth taken in different test tubes and incubated at 37 ° C for 6 hours till moderate turbidity was developed. The turbidity was matched with 0.5ml Mac Farlands turbidity standard (Mac Farlands, 1907).

Inoculation

0.5 ml of Mueller – Hinton broth was added in 15, 5 ml test tubes. 0.5 ml working antibiotic solution was added in the first tube. From the first tube 0.5 ml was transferred into the second tube further, in this manner it was serially diluted in two folds. 0.5 ml of the inoculum was added in each tube.

Incubation and interpretation of results

After inoculation the tubes were incubated at 37 ° C for 18 hours. The incubated tubes were observed for the lowest concentration of the drug that inhibits the growth of the organism by visual inspection of turbidity. Control Reference strain *E. coli* ATCC 25922 was used in order to have a comparative measure.

III. RESULTS AND DISCUSSION

3.1 Antibiotic susceptibility pattern of A. baumannii

The susceptibility pattern of the confirmed isolates against a panel of selected antimicrobial agents such as Ampicillin , Chloramphenicol , Co – trimaxazole , Tetracycline , Ceftriaxone , Cefuroxime , Ciprofloxacin , Ofloxacin , Nalidixic acid , Amikacin , Gentamycin and Amoxicillin .*A. baumannii* is more sensitive Multidrug resistance of *A. baumannii* e to Ceftriaxone and Cefuroxime i.e. 100 % followed by Amikacin (98.83%), Gentamycin (81.97%). Amoxicillin (79.06%), Ofloxacin (75%). Ciprofloxacin (56.97 %) , Nalidixic acid (47.67 %) , Chloramphenicol (44.18 %) , Co- trimaxazole (39.97 %) Ampicillin (31.39 %) and Tetracycline (24.41 %).*A. baumannii* is more resistance to tetracycline (75.58 %) followed by Ampicillin (68.60 %) , Co – trimaxazole (68.02) , Chloramphenicol (55.81 %) , Nalidixic acid (52.32 %) , Ciprofloxacin (43.02 %) , Ofloxacin (25 %) , Amoxicillin (20.93 %) , Gentamycin (18.02 %) and Amikacin (1.16 %).(Table-1).

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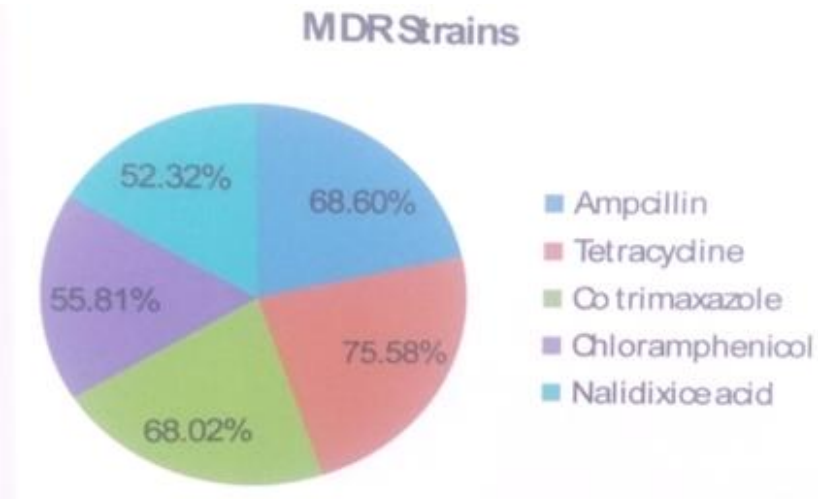
S1.No	Antibiotics	Sensitivity (%) n=172	Resistant (%) N=
1	Ampicillin	54(31.39%)	118(68.60%)
2	Chloramphenicol	76(44.18%)	96(55.81%)
3	Cotrimaxazole	55(31.97%)	117(68.02%)
4	Tetracycline	42(24.41%)	130(75.58%)
5	Ceftriaxone	172(100)	Nil(0)
6	Cefuroxime	172(100)	Nil(0)
7	Ciprofloxacin	98(56.97%)	74(43.02%)
8	Ofloxacin	129(75%)	43(25%)
9	Nalidixic acid	82(47.67%)	90(52.32%)
10	Amikacin	170(98.83%)	2(1.16%)
11	Gentamycin	141(81.97%)	31(18.02%)
12	Amoxicillin	136(79.06%)	36(20.93%)

***Table-1**. Antibiotic susceptibility pattern of A. baumannii*

3.2. MDR – strains

A total; of 113 isolates of *A. baumannii* were multidrug resistant more than half of isolates are resistance to Ampicillin (68.60 %) , Tetracycline (75.58 %) , Co- trimaxazole (68.02 %) , Chloramphenicol (55.81 %) , and Nalidixic acid (52.32 %)



MIC of antibiotics

The Minimum Inhibitory Concentration (MIC) of each antibiotic that is Ampicillin (Amp) , Chloramphenicol (CHO) , Cefotaxime (CF) , Piperacillin (PC) Co- trimaxazole (COT) , Ciprofloxacin (RC) , Ceftriaxone (CI) , Tetracycline (TE) , Ofloxacin (ZN) , Gentamicin (GM) , Amikacin (AK) . Gatifloxacin (GF) was determined for each organism of the 8 multidrug strains. The MIC was used to determine sensitivity and resistance (table-4 to 15)**.**

MIC of Ampicillin (AMP) for MDR-strains of A. baumannii.

Table 4 Shows the maximum inhibitory concentration of Ampicillin in *A. baumannii* was above 32 µg / ml in strain 1 and followed by above 0.5 µg / ml in strain 2, 8µg / ml in strain 3, 1 µg / ml in strain 4, 4 µg / ml in strain 5, 1 µg / ml in strain 6 , 2 µg / ml in strain 7 and 256 µg / ml in strain 8 . The highest MIC value is 256 µg / ml observed in Strain 8 and lowest MIC value is 0.5 observed in Strain 2.

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Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
AMP	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	+
	64	-	-	-	-	-	-	-	+
	32	-	-	-	-	-	-	-	+
	16	+	-	-	-	-	-	-	+
	8	+	-	-	-	-	-	-	+
	4	+	-	+	-	-	-	-	+
	2	+	-	+	-	+	-	-	+
	1	+	-	+	-	+	-	+	+
	0.5	+	-	+	+	+	+	+	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table4. MIC of Ampicillin (AMP) for MDR-strains of A. baumannii.

MIC of Chloramphenicol (CHO) for MDR-strains of A. baumannii.

Table-5 depicts the maximum inhibitory concentration of chloramphenicol in *A. baumannii* was above 2 µg / ml in strain 1 and followed by above 16 µg / ml in strata 2, 2 µg / ml in strain 3, 4 µg / ml in strain 4.8 µg / ml in strain 5, 4 µg / ml in strain 6, 32 µg / ml in strain 7 and 128 µg / ml in strain 8. The highest MIC value is 128 µg / ml observed in Strain & and lowest MIC value is 2 µg / ml observed in Strain 1 and Strain 3.

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
CHO	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	+
	32	-	-	-	-	-	-	-	+
	16	+	-	-	-	-	-	+	+
	8	-	+	-	-	-	-	+	+
	4	-	+	-	-	+	-	+	+
	2	-	+	-	+	+	+	+	+
	1	+	-	+	+	+	+	+	+
	0.5	+	+	+	+	+	+	+	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table5. MIC of Chloramphenicol (CHO) for MDR-strains of *A. baumannii.*

MIC of Cefuroxime (CFX) for MDR strains of A. baumannii

The Table, 6shows the maximum inhibitory concentration of Cefotaxime in *A. baumannii* was 2 µg/ml in strain I followed by 1 µg/ml in strain 2, 0.5µg/ml in strain 3, 1 µg/ml in strain 4 , 0.25 µg ml in strain 5 , 1µg/ml in strain 6, 4 µg/ml in strain 7 and 8 µg/ml in strain 8. The highest MIC value is 8 µg/ml observed in Strain & and lowest MIC value is 0.25 µg/ml observed in Strain 5.

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Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
CFX	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	+
	2	-	-	-	-	-	-	+	+
	1	+	-	-	-	-	-	+	+
	0.5	+	+	-	+	-	+	+	+
	0.25	+	+	+	+	-	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table6. MIC of Cefuroxime (CFX) for MDR strains of *A. baumannii*

MIC of Piperacillin (PC) for MDR strains of A. baumannii

The Table 7 Shows the maximum inhibitory concentration of Piperacillin in *A. baumannii* was 4 µg / ml in strain 1 and followed by above 8 µg / ml in strain 2, 4 µg / ml în strain 3. 32 µg / ml in strain 4 , 16 µg / ml in strain 5,8 µg / ml in strain 6 , 16 µg / ml in strain 7 and 64 µg / ml in strain 8. The highest MIC value is 64µg/ml observed in strain 8 and lowest MIC value is 4µg/ml observed in strain 1 and strain 3.

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
PC	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	+
	16	-	-	-	+	-	-	-	+
	8	-	-	-	+	+	-	+	+
	4	-	+	-	+	+	+	+	+
	2	+	+	+	+	+	+	+	+
	1	+	+	+	+	+	+	+	+
	0.5	+	+	+	+	+	+	+	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table7. MIC of Piperacillin (PC) for MDR strains of A. baumannii

MIC of Co-trimaxazole (COT) for MDR-strains of A. baumannii.

Table8. Shows the maximum inhibitory concentration of Co trimaxazole in *A. baumannii* was above of 32 µg / ml in strain I and followed by above 2 µg / ml in strain 2 , 8 ug / ml in strain 3 , 4 µg / ml in strain 4 , 2µg / ml in strain 5 , 1µg / ml in strain 6 , 0.5 µg / ml in strain 7 and 16µg / ml in strain 8.Thehighest MIC value is 32µg/ml observed in strain 8 and lowest MIC value is 0.5µg/ml observed in strain 7.

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Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
COT	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-
	8	+	-	-	-	-	-	-	+
	4	+	-	+	-	-	-	-	+
	2	+	-	+	+	-	-	-	+
	1	+	+	+	+	+	-	-	+
	0.5	+	+	+	+	+	+	-	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table8. ***MIC of Co-trimaxazole (COT) for MDR-strains of A. baumannii.***

MIC of Ciprofloxacin (CFC) for MDR-strains of A. baumannii

The Table. 9 Shows the maximum inhibitory concentration of Ciprofloxacin in *A. baumannii* was above 4µg/ml in strain 1 and followed by above lug / ml in strain 2,2 µg / ml in strain 3. 0.5 µg / ml in strain 4, 2 µg / ml in strain 5, 1 µg/ml in strain 6, 0.5 µg / ml in strain 7 and 32µg/ml in strain 8.The highest MIC value is 32 µg / ml observed in Strain 8 and lowest MIC value is 0.5µg/ml observed in Strain 4.

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
CFC	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	+
	8	-	-	-	-	-	-	-	+
	4	-	-	-	-	-	-	-	+
	2	+	-	-	-	-	-	-	+
	1	+	-	+	-	+	-	-	+
	0.5	+	+	+	-	+	+	-	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table9. MIC of Ciprofloxacin (CFC) for MDR-strains of A. baumannii

MIC of Ceftriaxone (CFT) for MDR-strains

The Table 10 Shows the maximum inhibitory concentration of Ceftriaxone in A baumannii was above 4 µg / ml in strain 1 and followed by above 1µg / ml in strain 2, 2 µg / ml in strain 3, 0.5 µg / ml in strain 4, 2 µg / ml in strain 5 , 1 µg / ml in strain 6 , 0.5 µg / ml in strain 7 and 32 µg / ml in strain 8. The highest MIC value is 32 µg / ml observed in Strain 8 and lowest MIC value is 0.5 µg / ml observed in Strain 4.

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Antibiotic	Concentration (µg/ml	1	2	3	4	5	6	7	8
CI	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	+
	4	+	-	-	-	-	-	-	+
	2	+	-	-	+	-	-	-	+
	1	+	+	-	+	+	-	+	+
	0.5	+	+	-	+	+	+	+	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table10. MIC of Ceftriaxone (CFT) for MDR-strains

MIC of tetracycline (TE) for MDR-strains.

The table.11 Shows the maximum inhibitory concentration of Tetracycline in *A. baumannii* was above 16 µg / ml in strain 1 and followed by 8µg / ml in strain 2 , 32 µg / ml in strain 3 , 4 µg / ml in strain 4 , 64 µg / ml in strain 5 , 8 µg / ml in strain 6 , 16 µg / ml in strain 7 and 8 is 256 µg / ml in strain 8 . The highest MIC value is 256 µg / ml observed in Strain 8 and lowest MIC value is 4 µg / ml observed in Strain 4.

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
TE	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	+
	64	-	-	-	-	-	-	-	+
	32	-	-	-	-	+	-	-	+
	16	-	-	+	-	+	-	-	+
	8	+	-	+	-	+	-	+	+
	4	+	+	+	-	+	+	+	+
	2	+	+	+	+	+	+	+	+
	1	+	+	+	+	+	+	+	+
	0.5	+	+	+	+	+	+	+	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table11. MIC of tetracycline (TE) for MDR-strains.

MIC of Ofloxacin (OFC) for MDR-strains of A. baumannii.

The table. 12 Shows the maximum inhibitory concentration of Ofloxacin in *A. baumannii* was above 8 µg / ml in strain 1 and followed by above 0.5 µg / ml in strain 2, 1 µg / ml in strain 3 , 0.5 µg / ml in strain 4 , 0.25 µg / ml in strain 5 , 0.5 µg / ml in strain 6 , 1 µg / ml in strain 7

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and 128 µg / ml in strain 8.The highest MIC value is 128 µg / ml observed in Strain 8 and lowest MIC value is 0.25 µg / ml observed in Strain 5.

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
OFC	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	+
	32	-	-	-	-	-	-	-	+
	16	-	-	-	-	-	-	-	+
	8	-	-	-	-	-	-	-	+
	4	+	-	-	-	-	-	-	+
	2	+	-	-	-	-	-	-	+
	1	+	-	-	-	-	-	-	+
	0.5	+	-	+	-	-	-	+	+
	0.25	+	+	+	+	-	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table12. MIC of Ofloxacin (OFC) for MDR-strains of A. baumannii.

MIC of Gentamicin (GM) for MDR-strains

The Table. 13 Shows the maximum inhibitory concentration of Gentamicin in *A. baumannii* was 16 µg / ml in strain 1 and followed by 4ug / ml in strain 2 , 4ug / ml in strain 3 , 1 µg / ml in strain 4 , 2 µg / ml in strain 5 , 0.5 µg / ml in strain 6 , 1 µg / ml in strain 7 and 8 µg / ml in strain 8.The highest MIC value is 16 µg / ml observed in Strain 1 and lowest MIC value is 0.5 µg / ml observed in Strain 6.

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
GM	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-
	8	+	-	-	-	-	-	-	-
	4	+	-	-	-	-	-	-	+
	2	+	+	+	-	-	-	-	+
	1	+	+	+	-	+	-	-	+
	0.5	+	+	+	+	+	-	+	+
	0.25	+	+	+	+	+	+	+	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table13. MIC of Gentamicin (GM) for MDR-strains

MIC of Amikacin (AK) for MDR-strains

The Table. 14 Shows the maximum inhibitory concentration of Amikacin in *A. baumannii* was above 2 µg / ml in strain 1 and followed by above 0.25 µg / ml in strain 2, 4 µg / ml in strain 3, 0.25 µg / ml in strain 4, 2 µg / ml in strain 5, 1 µg / ml in strain 6 , 0.25 µg / ml in strain 7 and 4 µg / ml in strain 8. The highest MIC value is 4 µg / ml observed in Strain 8 and lowest MIC value is 0.25 µg / ml observed in Strain 2, Strain 4 and Strain 7.

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Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
AK	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-
	2	-	-	+	-	-	-	-	+
	1	+	-	+	-	+	-	-	+
	0.5	+	-	+	-	+	+	-	+
	0.25	+	-	+	-	+	+	-	+
	0.125	+	+	+	+	+	+	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table14. MIC of Amikacin (AK) for MDR-strains

MIC of Gatifloxacin (GF) for MDR-strains

The Table. 15 Shows the maximum inhibitory concentration of Gatifloxacin in *A. baumannii* was above 2 µg / ml in strain 1 and followed by above 0.5 µg / ml in strain 2 , 0.25 µg / ml in strain 3 , 0.5 µg / ml in strain 4 , 0.125 µg / ml in strain 5 , 0.125 µg / ml in strain 6 , 0.25 µg / ml in strain 7 and 4 µg / ml in strain 8. The highest MIC value is 4 µg / ml observed in Strain 1 and lowest MIC value is 0.125 µg / ml observed in Strain 5 and Strain 6

Antibiotic	Concentration (µg/ml)	1	2	3	4	5	6	7	8
GF	256	-	-	-	-	-	-	-	-
	128	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	+
	1	+	-	-	-	-	-	-	+
	0.5	+	-	-	-	-	-	-	+
	0.25	+	+	-	+	-	-	-	+
	0.125	+	+	+	+	-	-	+	+
	0.062	+	+	+	+	+	+	+	+
	0.031	+	+	+	+	+	+	+	+

Table 15. MIC of Gatifloxacin (GF) for MDR-strain

IV. CONCLUSION

A. baumannii was considered as commensal of low grade pathogenicity and was frequently ignored whenever isolated in clinical samples. Now *A. baumannii* is emerged as one of the major cause of morbidity and mortality especially among nosocomial infection. A total of 172 *A. baumannii* isolates were tested for antibiotic sensitivity pattern. *A. baumannii* are more sensitive to Ceftriaxone and Cefuroxime and resistant to Tetracycline, Ampicillin, Co – trimaxazole and Chloramphenicol. Among 172 *A. baumannii* isolates 113 were considered as multidrug resistant I, e more than 3 classes of antibiotics. Based on the findings of present study concluded that MDR-strains is necessary to control nosocomial infection.

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