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Research Article

PREVALENCE AND DRUG RESISTANCE IN *ACINETOBACTER* SP. ISOLATED FROM INTENSIVE CARE UNITS PATIENTS IN PUNJAB, INDIA

TANVIR KAUR[1]*, CHAYANIKA PUTATUNDA[2], AROMA OBEROI[3], ASHISH VYAS[1], GAURAV KUMAR[1]

[1]Department of Microbiology, School of Bioengineering and Biosciences, Lovely Professional University, Phagwara - 144 402, Punjab, India. [2]Department of Microbiology, DAV University, Jalandhar - 144 012, Punjab, India. [3]Department of Microbiology, Christian Medical College and Hospital, Ludhiana - 141 008, Punjab, India. Email: tanvirkaur132@gmail.com

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ABSTRACT

Objective: This study was designed to study the prevalence and antibiotic susceptibility patterns of *Acinetobacter* sp. as isolated from patients lodged in intensive care units (ICUs) of a tertiary care hospital, Ludhiana, Punjab, India.

Methods: The clinical samples were simultaneously streaked on Blood agar and MacConkey agar. The identification of the bacterial isolates was carried out with the aid of Gram stain, motility test and along with a combination of other commonly employed biochemical tests. The antimicrobial susceptibility testing (AST) of all the bacterial isolates was carried out on Muller-Hinton agar through Kirby-Bauer disc diffusion method.

Results: *Acinetobacter* sp. formed a fair allowance contributing at 42% among all ICU culture positive samples. The respiratory tract samples had a major share at 63.15% for all samples attributed to be positive for *Acinetobacter* sp. nosocomial etiology. The antibiotic sensitivity pattern portrayed that more than 95% of *Acinetobacter* sp. isolates were multiple drug resistant (MDR) whereas >50% *Acinetobacter* sp. showed extensive drug resistant (XDR). The last resort for such *Acinetobacter* sp. nosocomial infections is left to colistin and polymyxin B.

Conclusion: *Acinetobacter* sp. is a highly prevalent microorganism among ICU patients of Ludhiana, Punjab, India, while its potential to acquire resistance toward commonly used antibiotics represents it as a grave threat to the health-care industry, therefore signifying the need for its regular monitoring in the health-care setups.

Keywords: *Acinetobacter* sp., Intensive care units, Nosocomial infections, Drug resistance.

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INTRODUCTION

Acinetobacter sp. is being credited as an omnipresent, Gram-negative coccobacilli, belonging to the family Moraxellaceae [1]. The bacteria are saprophytic, non-fastidious, rigidly aerobic, non-motile and known to exhibit pleomorphism. They form a part of the normal resident flora of the skin, respiratory, and intestinal tract [2]. *Acinetobacters* are oxidase negative organisms with an affirmation for catalase test. The genus includes 34 species of which 25 have valid names while the other 9 are named after their genomic group of which *Acinetobacter baumannii* is frequently ascribed in human infections [1]. The members of *Acinetobacter* sp. are extensively prevalent in soil, water, humans, and animals [3]. They have extraordinary ability to grow at a wide range of temperatures and pH, to survive on moist and dry surfaces, tolerate exposure to various commonly used disinfectants thereby allowing some *Acinetobacter* species (*A. baumannii*, *A. iwoffii,* and *A. haemolyticus*) to thrive well in hospital environment too [3]. The *Acinetobacter* sp. is found to be the second most common Gram-negative pathogen isolated from clinical samples after *Pseudomonas aeruginosa* [4]. The prevalence of *A. baumannii* is highly seen among debilitated or immunocompromised patients especially those who have experienced greater than 90 days of hospital stay [5]. *A. baumannii* is attributed to cause nosocomial or hospital-acquired infections (HAIs), particularly in patients those who have been lodged in intensive care units (ICUs) on account of having a breach in their immunity by one means or the other. The risk factors in ICUs include presence of indwelling urinary catheters, central venous lines, ventilator or other intubations, exposure to broad-spectrum antibiotics, immunosuppression *in lieu* of any underlying disease as diabetes mellitus, and HIV, peritoneal dialysis, neurosurgical interventions, or any other surgical procedures [6-9]. The most common HAIs caused by *A. baumannii* include bacteremia, genital and urinary tract infections (UTIs), iatrogenic or secondary meningitis, and infective endocarditis along with wound and burn infections [10]. The European ICU surveillance data (2009) showed that *Acinetobacter* sp. was credited at 11.9–21.8% times in ICU acquired infections [1]. The highlighting problem with *Acinetobacter* infections is its capability to acquire high-grade innate resistance against all commonly used antibiotics (multiple drug resistance [MDR]) with a stupendous overall mortality rate of 26–68% [11-13]. The MDR ability of *Acinetobacter* sp. can be explained on account of its ability to portray different mechanisms as synthesis of β-lactamases and other antibiotic modifying enzymes, overexpression of efflux pumps, loss of porin channels across the cellular membranes, target mutations along with mutations in ribosomes or lipopolysaccharide structure [14].

The lack of standard identification techniques makes identification of *Acinetobacter* sp. a cumbersome task. The studies done to depict the status and gravity of *Acinetobacter* infections all over the world shows a grim picture. With respect to the Indian subcontinent, the studies done in context with *Acinetobacter* sp. exhibits it as one of the most frequent and commonly isolated pathogens especially prevalent in ICUs of tertiary care hospitals which are otherwise considered as "Mecca of recovery." The antibiotic susceptibility tests thoroughly decipher the MDR nature of the *Acinetobacters* along with their inborn ability to depict high-grade resistance even to the last resort antibiotics as carbapenems and colistin. Hence, this study was designed to have an

overview of the prevalence of *Acinetobacter* sp. in the ICU patients of a tertiary care hospital, Ludhiana, Punjab, India, along with their concurrent sensitivity/resistance patterns toward commonly used or last resort antibiotics, so as to timely design out effective infection control measures against the same.

METHODS

Chemicals

The basal media including Nutrient broth, Blood agar (BA) base, MacConkey agar, and Mueller Hinton agar (MHA) were procured from HiMedia, Mumbai. The others in the list included Crystal violet, Lugol's iodine, acetone, ethanol, safranin, ethylenediaminetetracetic acid (EDTA), hydrogen peroxide, p-dimethylaminobenzaldehyde, Iso-amyl alcohol, concentrated hydrochloric acid, peptone, glucose, dipotassium hydrogen phosphate, methyl red (MR), potassium hydroxide, α-naphthol, Simmon's Citrate agar, tetramethyl para phenylene diamine dihydrochloride, Urea agar base (Christensen), sulfanilic acid, acetic acid, α-naphthylamine, and distilled water.

Study population and sample collection

This study was undertaken during 2015, at a tertiary care hospital in Ludhiana, Punjab, India. A total of 298 clinical samples were collected which mainly fell under three broad groups or categories, namely Pus, Blood, and Urine. The pus category broadly included samples such as bronchoalveolar lavage (BAL), mini BAL, sputum, Cerebrospinal fluid, tips (Endotracheal tube tips, central lines, cava fix tips, and other catheter tips), superficial pyogenic infections or bland pus samples, swabs (throat, high vaginal, bedsore, and wound), body fluids (pleural, peritoneal, tracheal, and skin blister), and external ventricular drain and a biopsy specimen. The blood samples comprised of venous blood, peripheral blood, bone marrow aspirate, etc. The urine samples were a mix of bland urine samples along with a catheter tip. All samples were collected under aseptic conditions [15].

Culture and identification

All the samples including bland pus, respiratory tract samples, fluids, swabs and urine samples were surface streaked onto BA and MacConkey agar plates. The catheter or central line tips along with the biopsy specimen were directly inoculated in Nutrient broth for 24 h and later streaked on to the surface of BA and MacConkey agar plates. All the plates were incubated at 37°C for 24 h and later on observed for the visible bacterial growth. The blood samples and bone marrow aspirates were directly inoculated into the commercially prepared blood culture bottles (BD BACTEC) and incubated in an automated blood culture system (BACTEC) up to 7 days with periodic monitoring. The positive blood culture samples so obtained for bacterial growth were also later on seeded onto BA and MacConkey agar plates.

The bacterial isolates were identified based on a combination of phenotypic and biochemical characteristics including colony characteristics as inscribed on BA and MacConkey agar, Gram's staining, motility test along with an array of other common biochemical tests as coagulase, catalase, indole, MR and Voges Proskauer, citrate, oxidase, urease, and nitrate reductase [16,17].

Antibiotic sensitivity test

Antibiotics used

All the bacterial cultures were screened for their sensitivity against a panel comprising commonly used first, second, and third line antibiotics in the format of standard discs as amikacin (AK, 30 µg), ampicillin (AMP, 10 µg/disc), cefoperazone (CPZ, 75 µg/disc), cefoperazone/sulbactam (CFS, 75/30 µg/disc), cefotaxime (CTX, 30 µg/disc), cefoxitin (CX, 30 µg/disc), ceftazidime (CAZ, 30 µg/disc), ceftriaxone (CTR, 30 µg/disc), chloramphenicol (C, 30 µg/disc), ciprofloxacin (CIP, 5 µg/disc), colistin (10 µg/disc), cotrimoxazole (COT, 1.25/23.75 µg/disc), gentamycin (GEN, 10 µg/disc), imipenem (IPM, 10 µg/disc), meropenem (MRP, 10 µg/disc), netromycin (NET, 30 µg/disc), ofloxacin (OF, 5 µg/disc), piperacillin/tazobactam (PIT, 100/10 µg/disc), polymyxin B (PB, 300 units/disc), ticarcillin (TI, 75 µg/disc), and tobramycin (TOB, 10 µg/disc). All the antibiotic discs were obtained from HiMedia, Mumbai, and stored under standard conditions.

Susceptibility testing

The antimicrobial susceptibility of all bacterial isolates was tested through Kirby-Bauer disc diffusion susceptibility test method on MHA plates (HiMedia, Mumbai) as per the guidelines of Clinical and Laboratory Standards Institute (CLSI 2017) [18]. The isolates were inoculated in Nutrient broth (0.5 McFarland standards) and seeded onto the MHA plates using sterilized cotton swabs. The plates were left to dry for a few minutes. The antibiotic discs were placed onto the surface of agar plates using sterilized forceps. All the plates were then incubated at 37°C for 24 h so as to evaluate the antimicrobial activity by measuring the diameter of the zone of inhibition around the antibiotic discs and then interpreting them according to the CLSI guidelines.

RESULTS

Study population and sample collection

This study was basically a prospective observational study. All the clinical samples were collected from patients of different age and sex, who have been admitted to varied ICUs for more than 72 h. Of the aggregate of 298 clinical samples collected, the amount of samples sorted for the pus or pyogenic category came out to be at 142 while a total of 102 samples falling in the category of blood samples along with 54 samples as identified for urine category were also simultaneously collected (Table 1).

Isolation of the pathogenic bacteria

Out of the total 298 clinical samples so collected, 69 (23.15%) samples came out to be positive in routine culture which is clearly depicted in Fig. 1. The various isolates were identified and sorted on the aforementioned criteria. Out of the total positive isolates,

Table 1: Comparative distribution of various clinical samples as collected from varied ICUs

Sample group	Sample type	Sample number
Pus	Bronchoalveolar lavage (BAL)	3
	Mini BAL	11
	Sputum	19
	Cerebrospinal fluid	6
	Tips	72
	Superficial pyogenic infections	6
	Swabs	6
	Body fluids	17
	External ventricular drain	1
	Biopsy	1
Blood		102
Urine		54
	Total	298

ICUs: Intensive care units

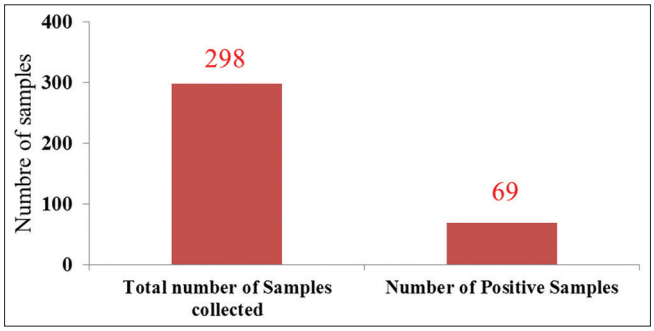

Fig. 1: Comparative assessment of total collected samples and culture positive samples

highest share was recorded for *Acinetobacter* sp. (42.02%), followed by *P. aeruginosa* (15.94%), *Klebsiella* sp. (14.49%), *Escherichia coli* (13.04%), *Staphylococcus aureus* (4.34%), *Enterococcus* sp. (4.34%), and *Enterobacter* sp. (4.34%) and the least being attributed to *Pneumococcus* (1.44%). The comparative percentage distribution for various nosocomial ICU isolates is shown in Fig. 2.

Characterization and prevalence of *Acinetobacter* sp.

The microscopic examination for Gram staining represented *Acinetobacter* sp. to be short, Gram-negative, coccobacilli, arranged singly or in pairs. The isolates were identified as *Acinetobacter* sp. by the appearance of white to cream colored, smooth, circular colonies with an entire edge, as seen on BA and being non-fermenting with a bit of pinkish tinge as seen on MacConkey agar which can be primarily visualized in Fig. 3 [19]. On further incubation up to 48 h, the size of the colonies increased, and they became mucoid. The *Acinetobacter* sp. showed positivity for catalase test, whereas it came out to be negative for motility test, oxidase test, indole, MR, and urease test [19-21].

The highest pathogenic bacterial existence was asserted for *Acinetobacter* sp. being at a breathtaking stature of 42.02% among all the culture positive ICU isolates while *Pneumococcus* accounted for being the lowest at 1.44%. Of the total 29 *Acinetobacter* sp. positive samples, 23 were only containing *Acinetobacter* sp. whereas the remaining 6 samples, along with *Acinetobacter* sp. were also containing other pathogenic bacteria such as *P. aeruginosa* (5 samples) and *E. coli* (1 sample). The aggregate percentage for Gram-positive isolates came out to be at 10.14% whereas the percentage of all Gram-negative isolates stood by a whopping 89.85% thus, highlighting the prevalence

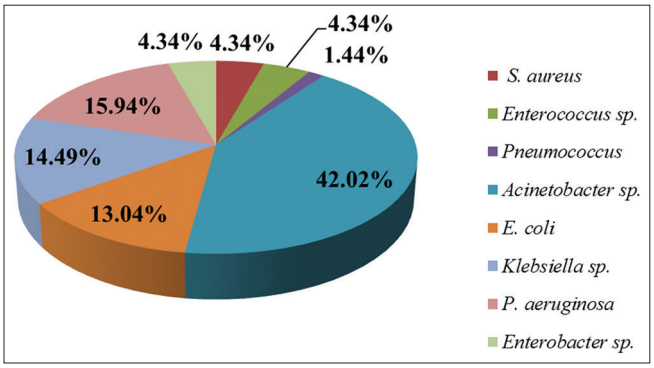

Fig. 2: Percentage distribution for various nosocomial intensive care unit isolates

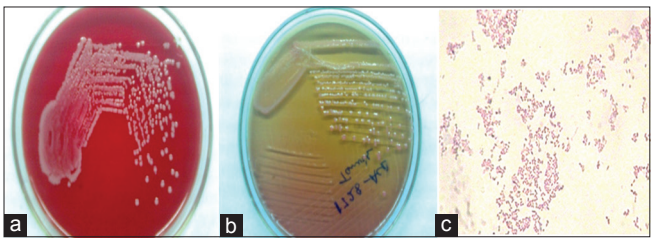

Fig. 3: Identification of *Acinetobacter* sp. (a) Growth on Blood agar (b) Growth on MacConkey agar (c) Gram staining

of Gram-negative pathogens as the major nosocomial etiological agents in the ICUs of Ludhiana, Punjab, India.

***Acinetobacter* sp. and associated infections**

The different types of infections attributed to *Acinetobacter* sp. as summarized in Table 2, showed that respiratory tract was the predominantly affected area (63.15%) in the otherwise vulnerable ICU patients and the least susceptible system was the hemopoietic system or the plethora of bloodstream (7.14%).

Antimicrobial susceptibility testing (AST) for *Acinetobacter* sp. isolates

A total of 29 *Acinetobacter* sp. isolates obtained in this study were subjected to AST using agar disc diffusion method. Based on the CLSI guidelines 2017, the effects shown by standard antibiotics against various *Acinetobacter* sp. isolates, were classified as sensitive (S), intermediate (I), and resistant (R). The results of antimicrobial sensitivity pattern of various *Acinetobacter* sp. ICU isolates against commonly used antibiotics can be thus visualized and easily interpreted in Table 3.

Ranking of antibiotic resistance for various *Acinetobacter* sp. isolates

The ranking of antibiotic resistance for various *Acinetobacter* sp. isolates toward commonly used antibiotics is summarized in Table 4. The results specified that all *Acinetobacter* sp. isolates in this study were mostly MDR, which represent a significant concern and threat.

A full cent percent (100%) resistant was encountered by antibiotics such as AMP, some second-generation cephalosporins as CPZ, CTX, CX, CTR, and a β -lactam antibiotic as TI, which paved the way for labeling these drugs as being the top-ranked drugs with respect to the pedestal of drug resistance. The ranking for antibiotic resistance showed a descending trend in context with drugs as CAZ (96.55%), a fluoroquinolone as CIP (96.55%), followed by COT (89.65%), PIT (89.65%), aminoglycosides as AK (86.20%) and GEN (86.20%), again to be followed by a fluoroquinolone as OF (82.75%), aminoglycosides as TOB (82.75%) and NET (79.31%), carbapenems as IPM (65.51%) and MRP (65.51%), C (62.06%), and CFS (55.17%), and least resistance was experienced by polymyxins as CL (3.44%) and PB (0%) thereby ranking them to be the most sensitive drugs and the only last living hope on the present drug horizon.

DISCUSSION

The ability of the bacterium to survive on inanimate surfaces for prolonged time periods extending from 3 days to 5 months, facilitates its spread in health-care settings thus, it can be easily detected on various common and routine use health care set up items as sinks, floors, cupboards, bed linens, mattresses, bed rails, curtains, hospital trolleys, and ventilation equipment such as respirators and AMBU bags [14].

The MDR isolates of *Acinetobacter* sp. are globally emerging as a serious opportunistic nosocomial threat particularly in the ICUs. The multidrug-resistant (MDR) *Acinetobacter* sp. is defined as the one which is resistant to all three classes of antimicrobial agents as - penicillins, cephalosporins, fluoroquinolones, and aminoglycosides. The extensive drug resistant (XDR) *Acinetobacter* sp. shall be the MDR isolates which are also resistant to carbapenems (IPM and MRP) [22].

Table 2: Comparative distribution of various *Acinetobacter* sp. associated infections

Type of infection	Total number of positive samples	Number of samples positive for *Acinetobacter* sp.	% Distribution
Respiratory infections	38	24	63.15
Bloodstream infections	14	1	7.14
Surgical site infections	7	1	14.28
Urinary tract infections	6	1	16.66
Superficial pyogenic infections	4	2	50

Table 3: Antibiotic sensitivity pattern of *Acinetobacter* sp. isolates against commonly used antibiotics

Antibiotic used	Symbol	Dose (µg/disc)	N (%)			Total
			Sensitive (S)	Intermediate (I)	Resistant (R)	
Amikacin	AK	30	3 (10.34)	1 (3.44)	25 (86.20)	29
Ampicillin	AMP	10	0 (0)	0 (0)	29 (100)	29
Cefoperazone	CPZ	75	0 (0)	0 (0)	29 (100)	29
Cefoperazone/Sulbactam	CFS	75/30	9 (31.03)	4 (13.79)	16 (55.17)	29
Cefotaxime	CTX	30	0 (0)	0 (0)	29 (100)	29
Cefoxitin	CX	30	0 (0)	0 (0)	29 (100)	29
Ceftazidime	CAZ	30	1 (3.44)	0 (0)	28 (96.55)	29
Ceftriaxone	CTR	30	0 (0)	0 (0)	29 (100)	29
Chloramphenicol	C	30	9 (31.03)	2 (6.89)	18 (62.06)	29
Ciprofloxacin	CIP	5	1 (3.44)	0 (0)	28 (96.55)	29
Colistin	CL	10	28 (96.55)	0 (0)	1 (3.44)	29
Cotrimoxazole	COT	1.25/23.75	3 (10.34)	0 (0)	26 (89.65)	29
Gentamycin	GEN	10	3 (10.34)	1 (3.44)	25 (86.20)	29
Imipenem	IPM	10	9 (31.03)	1 (3.44)	19 (65.51)	29
Meropenem	MRP	10	8 (27.58)	2 (6.89)	19 (65.51)	29
Netromycin	NET	30	6 (20.68)	0 (0)	23 (79.31)	29
Ofloxacin	OF	5	2 (6.89)	3 (10.34	24 (82.75)	29
Piperacillin/Tazobactam	PIT	100/10	2 (6.89)	1 (3.44)	26 (89.65)	29
Polymyxin-B	PB	300 units	29 (100)	0 (0)	0 (0)	29
Ticarcillin	TI	75	0 (0)	0 (0)	29 (100)	29
Tobramycin	TOB	10	5 (17.24)	0 (0)	24 (82.75)	29

N: Number of isolates

Table 4: Ranking of antibiotic resistance for *Acinetobacter* sp. isolates against commonly used antibiotics

Serial No.	Rank	Antibiotic used	Resistant isolates		
			Number	%	
1	1	Ampicillin	29	100	Most Resistant
2	1	Cefoperazone	29	100	
3	1	Cefotaxime	29	100	
4	1	Cefoxitin	29	100	
5	1	Ceftriaxone	29	100	
6	1	Ticarcillin	29	100	
7	2	Ceftazidime	28	96.55	
8	2	Ciprofloxacin	28	96.55	
9	3	Cotrimoxazole	26	89.65	
10	3	Piperacillin/Tazobactam	26	89.65	
11	4	Amikacin	25	86.20	
12	4	Gentamycin	25	86.20	
13	5	Ofloxacin	24	82.75	
14	5	Tobramycin	24	82.75	
15	6	Netromycin	23	79.31	
16	7	Imipenem	19	65.51	
17	7	Meropenem	19	65.51	
18	8	Chloramphenicol	18	62.06	
19	9	Cefoperazone/Sulbactam	16	55.17	
20	10	Colistin	1	3.44	
21	11	Polymyxin-B	0	0	Most Sensitive

The commonly encountered hospital isolates of *Acinetobacter* sp. include *A. baumannii*, *A. iwoffii* and *A. hemolyticus.* The risk factors attributed to the life-threatening *Acinetobacter* sp. related nosocomial infections seek their grounds on account of increased invasive or surgical procedures, excessive use of broad-spectrum antimicrobials and prolonged stay in the hospitals [19]. The treatment of *Acinetobacter* sp. infections holds a backlog *in lieu* of their property to rapidly develop resistance to antimicrobials [23]. It is also reported that *Acinetobacter* sp. can inherit genes from *Pseudomonas* sp. and *Salmonella* sp. thorough horizontal gene transfer and this property of innate resistance is exclusively plasmid-borne [14].

In this study, the pathogen under question constituted a way high of 42.02%, among all the nosocomial bacterial ICU isolates. Similarly, higher rates of prevalence with respect to the Indian scenario were also observed by other researchers [24,25]. The respiratory problems caused due to MDR *Acinetobacter* sp. are the most commonly associated problems with the ICU patients [14]. According to the findings of this study, *Acinetobacter* sp. was also mostly isolated from respiratory tract samples followed by the specimens falling under pus category, succeeded by UTIs, surgical site infections, and finally the bloodstream infections (BSIs). The higher incidence of isolation of *Acinetobacter* sp. from respiratory tract samples has also been previously well documented by various researchers worldwide [26-28]. Among the ICU infections as prevailing in Europe, a share of about 10% have been acknowledged to *Acinetobacter* sp. [29].

The colonization of *Acinetobacter* sp. in indwelling patients, employees of health-care facility and healthy subjects occur frequently. The upcoming challenge lies in the thorough and effective management of *Acinetobacter* sp. infections as it shows an innate predilection for broad-spectrum antimicrobial resistance along with its emerging ability to

rapidly develop novel patterns of drug resistance. Antimicrobial agents typically active against *Acinetobacter* sp. include the carbapenems (IPM and MRP), AK, sulbactum, CL, Rifampin, and tetracyclines but recent studies report its resistance against β-lactam antibiotics, broad-spectrum cephalosporins, aminoglycosides and fluoroquinolones too, which are otherwise considered as the ground line or basic stepwise treatment so as to be followed according to the medical therapeutics with respect to the severity of corresponding infection [24].

During this study, more than 95% of the *Acinetobacter* sp. isolates were found to be MDR isolates while majority of them were resistant to commonly used antibiotics such as CAZ, CIP, AK, GEN, OF, TOB, and NET suggesting that MDR isolates are widely increasing in this geographical region too, perhaps due to the prolonged and indiscriminate use of such antibiotics in the health-care setups. A study done in Pune, India, showed that about 48% to 68.6% of *A. baumannii* isolates were MDR [30].

Till recently carbapenems (MRP and IPM) were considered as the gold standard for treating *Acinetobacter* sp. infections, but unfortunately, carbapenem resistance toward *Acinetobacter* sp. is becoming common globally [31,32]. Resistance to carbapenems (XDR isolates) has also been widely reported [33,34]. In general, *Acinetobacter* sp. shows a greater resistance to MRP than IPM [35,36]. A study conducted on *A. baumannii* isolates in US quoted IPM resistance to be at the scale of 23.1% [37]. In this study also, the resistance pattern as exhibited for carbapenems along with PIT exceeded the mid-way dilemma, i.e. being greater than 50%, thereby indicating that the *Acinetobacter* sp. isolates under question were definitely of the order of XDR too.

Pan drug-resistant *A. baumannii* isolates, i.e., isolates resistant to all antimicrobial agents *in vitro*, have also been reported from some areas of the world as Asia and the Middle-east [38]. The prospective of combination therapy could be given a thought, but it is still tagged as controversial due to the non-availability of any proven improvement data in the context of subjective mortality along with a subsequent high-grade toxicity [38].

In this present face of broad-spectrum antimicrobial resistance, CL aka polymyxin E typically retains its activity against *Acinetobacter* sp., but it is also duly reported to be neurotoxic, nephrotoxic, and ototoxic in the long run thereby limiting its routine use, though the toxicity has been found to be correspondingly similar to other antimicrobials used frequently in ICUs [38]. In the present study, the resistance to CL was seen in the order of 3.44% leaving PB as the last resort against which this *Acinetobacter* sp. was sensitized. A recent study in an ICU of a tertiary hospital, Haryana, India, also showed upcoming resistance patterns against CL in the scale of 1.2% [28]. A study done in the Western Pacific region showed that 3.3% of *A. baumannii* isolates were resistant toward CL [39].

The higher percentage of antimicrobial resistance toward carbapenems as demonstrated by the isolated *Acinetobacter* sp. in this study encompassing Ludhiana, Punjab, India, leaves us with polymyxins as the only last standing post in this crucial war against MDR and XDR *Acinetobacter* sp. isolates. Thus, the need of the hour is to seriously undertake stringent measures that should have a positive impact against such obstinate MDR and XDR nosocomial isolates, thereby decreasing and restricting the use of antimicrobials to only those situations where they are actually called for and that too in a proper dose and for a proper duration of time.

CONCLUSION

During this study, a total of 298 clinical samples were collected from a various set of ICU patients and subjected to isolation and characterization for various nosocomial bacterial isolates. Among the total positive culture samples so obtained, 42% were allocated to *Acinetobacter* sp. while most of the HAIs ascribed to *Acinetobacter* sp. were related to the respiratory tract (63.15%). The drug resistance patterns showed that >95% of *Acinetobacter* sp. were MDR, whereas more than 50% of *Acinetobacter* sp. isolates showed XDR. The last ray of hope for such dreaded *Acinetobacter* sp. hospital-based etiology at present is only left to CL and PB. Therefore, in the perspective of this study, it could be concluded that emergence of high-grade MDR *Acinetobacter* sp. within the ICUs of Ludhiana, Punjab, India, is the newest problem on the board. The ongoing MDR nature of this pathogen to multiple drugs or even to the last line antibiotics is a severe looming threat with respect to the already immunity weaned ICU inhabitants. The probable escape lies in the thorough periodic monitoring of the health-care setups so as to plan out effective infection control strategies and chalking out new treatment options for genuinely controlling such stubborn hospital-based *Acinetobacter* sp. pathologies within the overall domain of Punjab, India.

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