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Resistance and Sensitivity of Pseudomonas Aeruginosa against Common Used Antibiotics in Tishreen University Hospital, Syria

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ABSTRACT

The multi-drug resistant bacteria to antibiotic is a global problem and wide spread which leads to infection that is difficult to treat and may result in death. Peudomonas aeruginosa is an opportunistic pathogen causing severe, acute and chronic nosocomial infections in urinary and pulmonary tracts, burns and wounds. Currently, there is an urgent and global need for alternative antimicrobial strategies to fight the continuous rise of P. aeruginosa resistance to different antibiotics. In this paper, we present the sensitivity and resistance of Pseudomonas aeruginosa isolated from patients' samples admitted to Tishreen university hospital, Latakia, Syria against common used antibiotics.

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Introduction

The multi-drug resistant bacteria to antibiotic is a global problem and wide spread which leads to infection that is difficult to treat and may result in death. Antibiotic resistance has affected people in any time or age of life and this makes it one of the biggest world's public health problems [1]. Peudomonas aeruginosa is an opportunistic pathogen causing severe, acute and chronic nosocomial infections in urinary and pulmonary tracts, burns and wounds. Currently, there is an urgent and global need for alternative antimicrobial strategies to fight the continuous rise of P. aeruginosa resistance to different antibiotics [2].

Strains of Pseudomonas aeruginosa are known to utilize their high levels of intrinsic and acquired resistance mechanisms to counter most antibiotics. In addition, adaptive antibiotic resistance of P. aeruginosa is a recently characterized mechanism, which includes biofilm-mediated resistance, and is responsible for recalcitrance and relapse of infections [3]. The most exposed patients to the risk of infection and reaching a critical condition are those with weak immunity especially hospitalized and intensive care patients especially for those who suffer from chronic lung diseases [4]. We will specifically discuss Pseudomonas aeruginosa resistance to antibiotics at Tishreen university hospital, Latakia, Syria which is one of the most resistant bacteria to antibiotics and it even lives in antiseptics.

Methods

We conducted this study from April 2022 to May 2022 and made a retrospective study of bacterial isolates from patients during 2021-2022 archived in the laboratory section of Tishreen university hospital, Latakia, Syria. One hundred samples of Pseudomonas aeruginosa were included in this study, which were isolated from wound swabs, burns, urine samples, urine catheter and endo-tracheal tract secretions. After culturing on blood agar and Eosin-Methylene Blue agar for 24 hours, identification was performed using oxidase test in addition to the distinguished odor and bluish green pigmentation. Antibiotic sensitivity test was carried out on Muller- Hinton agar, and 55 different antibiotic discs were tested using disc diffusion method. Then, after 24 hours sensitivity and resistance were recorded by measuring the inhibition zone diameter.

Results

a) Percentage of Samples

According to our results we found that wounds and bum swabs samples were predominant with a percentage of 70% of all sample, then urine sample with a percentage of 21% and the least percentage was for body fluids with a percentage of 3%

b) Sensitivity and Resistance to Antibiotics

We present the sensitivity and resistance of Pseudomonas aeruginosa isolated from patients' samples admitted to Tishreen university hospital, Latakia, Syria against each used antibiotics.

Antibiotic's Name	CODE	Number of samples	Sensitive (%)	Resistant (%)
Levofloxacin	LEV	39	19(48%)	20(52%)
Amoxicillin	AMX	6	2(33%)	4(67%)
Carbenicillin	CAR	19	11(48%)	8(52%)
Cefoperazone	CPZ	30	23(77%)	7(23%)
Tetracycline	TET	23	5(22%)	18(78%)
sulbactam	CPS	9	9(100%)	0(0%)
Tigecyline	TIG	8	5(62.5%)	3(37.5%)
IMEPENEM	IMP	27	25(93%)	7(7%)
Augmentin	AUG	28	3(11%)	25(89%)
Norfloxacin	NOR	49	26(53%)	23(47%)
cefixime	CXM	34	3(9%)	31(91%)
Linezolid	LNZ	21	5(24%)	16(76%)
Clarithromycin	CLM	23	1(4%)	22(96%)
cefprozil	CFO	34	4(12%)	30(88%)
cephradin	CRD	5	3(60%)	2(40%)
tobramycin	TOB	14	3(21%)	11(79%)
cefotaxime	CTX	16	4(25%)	12(75%)
oxacillin	OXC	2	0(0%)	2(100%)
Streptomycin	STR	6	1(17.7%)	5(82.3%)
Neomycin	N	1	0(0%)	1(100%)
Piperacillin	PIP	5	5(100%)	0(0%)
Clindamycin	CLN	1	0(0%)	1(100%)
Erythromycin	ERY	3	0(0%)	3(100%)
cefaclor	CEC	3	0(0%)	3(100%)
Colistin	COL	15	11(73.4%)	4(26.6%)
Amikacin	AN	5	4(80%)	1(20%)
ceftazidime	CAZ	5	5(100%)	0(0%)
Chloramphenicol	CHL	1	0(0%)	1(100%)
Aztreonam	ATM	4	3(75%)	1(25%)
Cefpirome	CPR	11	6(54.5%)	5(45.5%)
Cefuroxime	CRX	18	0(0%)	18(100%)
azithromycin	AZM	7	2(28.52%)	5(71.48%)
Cefazolin	CZ	3	0(0%)	3(100%)
Ofloxacin	OFX	7	5(71.5%)	2(28.5%)
Carbenicillin	CB	6	3(50%)	3(50%)
Doxycycline	D	12	2(17%)	10(83%)
Meropenem	MER	15	12(80%)	3(20%)
Minocycline	MIN	6	0(0%)	6(100%)
Ertapenem	ETP	21	17(81%)	4(19%)
Penicillin G	PEN	12	0(0%)	12(100%)
pipemidic	PPA	6	2(33%)	4(67%)
vancomycin	VAN	9	0(0%)	9(100%)
amikacin	AMK	62	47(76%)	15(24%)
Cefpodoxime	CPD	23	5(22%)	18(78%)
cefdinir	CNR	31	4(13%)	27(87%)
nitrofurantoin	NIT	24	5(20.8%)	19(79.2%)
rifampicin	RIF	10	2(20%)	8(80%)
ampicillin	AMP	20	0(0%)	20(100%)

Trimethoprim/ sulfamethoxazole	COT	36	11(30.5%)	25(69.5%)
Doripenem	DOR	6	5(83.3%)	1(16.7%)
Gentamicin	GEN	18	3(16.7%)	15(83.3%)
Polymyxin	POL	27	19(70.3%)	8(29.7%)
Cefadroxil	CDR	12	3(25%)	9(75%)
Ceftriaxone	CTR	33	12(36.4%)	21(63.6%)
Nalidixic acid	NAL	27	4(14.8%)	23(85.2%)

Discussion

The most sensitive antibiotics were (sulbactam + cefoperazon) and piperacillin with a percentage of 100%, then imipenem with a percentage of sensitivity 93%. This result should give us a good chance to save those antibiotics for emergency cases. Then Doripenem in the second place with a percentage of 83.3%, ertapenem 81% and meropenem 80% and amikacin 80%.

On the other hand, the most resistant antibiotics were (Ampicillin, Cefaroxime, cefixime, and Penicillin G) with a percentage of 100% then Clarithromycin (96%) and Cephalothin (95.2%). We can also notice that vancomycin is 100% resistant which is an expected result for an antibiotic only effective against gram positive bacteria. Our results were in concordance to a previous Saudi study that found the lowest resistance rates of Pseudomonas aeruginosa were by amikacin 7.4% and piperacillin-tazobactam 4.9% [5].

Interestingly, we found 3 important cases of multidrug resistance to all used antibiotics The first was isolates from wound swab, the second was from urine catheter and the last one isolated from endo-tracheal tract secretions. These cases were resistant to all known antibiotics and this resistance is considered life threatening.

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