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RESEARCH ARTICLE

Study of the Effect of some Antibiotics on Pseudomonas Aeruginosa Isolated from Wound and Burn Abscesses

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ABSTRACT

The study included the collection of 230 swabs from patients with wound and burn infections from Salah al-Din Hospital from January to October, and a number of chemistry tests diagnosed developing colonies, 154 clinical isolates (96 burn isolates and 58 wound isolates) of the total number of isolates could be diagnosed and the diagnosis was confirmed using the API 20E system. The isolates were found to have multiple antibiotic resistance as all isolates showed 100% resistance to Ampicillin and variable resistance to Norfloxacin, Aztreonam, Ceftriaxone, Ciprofloxacin and Trimethoprim (72%, 80%, 86%, 87% and 88%) respectively, and showed sensitivity to Ofloxacin and Piperacillin (80% and 90%), respectively, and high sensitivity to Meropenem and Imipenem (100%).

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INTRODUCTION

Nosocomial infections are among the most complex health issues facing physicians worldwide. They are of great importance in public health issues nowadays despite the use of modern techniques in performing surgical operations and the good care shown by medical staff towards burns and wounds patients, causing an increase in human and economic damage, as well as an increase in treatment costs and an increase in the length of stay in the hospital [1], and [2]. Pseudomonas aeruginosa is one of the leading bacteria causing these infections [3]. Pseudomonas aeruginosa is a major cause of Pseudomonas aeruginosa is a major cause of burn infections that have claimed the lives of many burn patients and are a cause of high morbidity and mortality, These infections are caused by either endogenous pathogens (Endogenous), represented by the normal flora on the skin, intestines and respiratory tract of recumbents, or exogenous, such as transmission from medical staff, visitors, surgical instruments, air, water, food and floors [4]. [5] The indiscriminate use of antibiotics, including beta-lactam antibiotics, in hospitals and communities is the reason for the emergence of resistant strains and ineffective treatment and the emergence of strains characterized by multiple resistance to the antibiotic, which is a medical issue due to the difficulty of controlling diseases due to antibiotic resistance. Beta-lactam enzymes are at the forefront of the means used by

microorganisms to resist the action of beta-lactam antibiotics [6], and [7]. In addition, P. aeruginosa possesses an outer membrane that contains protein channels (Porins), and any alteration, modification, or reduction in the number of these channels leads to resistance to many antibiotics [8], and [9].

RESEARCH METHODOLOGY

Sample collection: A total of 230 samples were collected from inpatients and outpatients with burn and wound infections at Tikrit Teaching Hospital.

Diagnosis: Samples were cultured on developmental media and then re-cultured on selective media such as citarmide medium and the diagnosis was confirmed using API 20 Vitik.

Antibiotic susceptibility testing: The sensitivity of the isolates was studied by using antibiotic discs on an Acker-Muller-Hinton medium according to the method [10]

RESULTS AND DISCUSSION

Scientific studies indicate a disparity in the isolation rates of bacteria due to the difference in the source of isolation, the number of samples, the geographical location, the method of sterilization of wounds or burns, and the number of times sterilizations, as well as the common and indiscriminate use of antibiotics, which played a major role in the emergence of resistance to these bacteria [11].

The distribution of the isolated bacteria according to the isolation sources according to the final diagnostic results is shown in Table (1). It is clear from the table that P. aeruginosa was the most prevalent in burn infections (62%), followed by wound infections (38%). This indicates that P. aeruginosa is the main cause of burn abscesses. The results of P. aeruginosa were consistent with a study conducted in Iran by [5]. The percentage of P. aeruginosa was 73.1%, and the current study also agreed with the study [12] that P. aeruginosa was the most isolated bacterium in burn wounds.

Sensitivity of P. Aeruginosa to antibiotics

The sensitivity of Pseudomonas aeruginosa to antibiotics was tested in Table (2) as P. aeruginosa isolates showed high resistance to beta-lactam antibiotics. P. aeruginosa showed high resistance to beta-lactam antibiotics, as the resistance rate to Ampicillin was 100%. This resistance is due to a change in the structure of Penicillin Binding Proteins (PBPs) or the production of beta-lactam enzymes that can attack a wide range of beta-lactam antibiotics, The results of the study agreed with the findings of [13], while the isolates showed different resistance to Ceftriaxone, Ciprofloxacin, Norfloxacin, Aztreonam, and Trimethoprim.) 72%, 80%, 86%, 87%, and 88%, respectively. The results of the current study are in agreement with [14], and [15]. The reason for multiple resistance is attributed to the presence of resistance genes in clusters, which may be transferred together to the recipient cell by special DNA elements known as integrons located on the plasmid or bacterial chromosome, and the capture of genes that code for resistance can be restricted by the Recombination process, which enables integrons to attach to one or more gene cassette within its binding sites and thus form clusters of antibiotic resistance genes and beta-lactam antagonists [16]. While the majority of isolates showed sensitivity to Ofloxacin and Piperacillin by (80% and 90%), respectively, which is consistent with the findings of [17], and all isolates showed high sensitivity to Imipenem and Meropenem by 100%, the results agreed with the findings of [18], and [14], who found that P. aeruginosa is highly sensitive to Piperacillin. Carbapenems are very effective in treating infections caused by P. aeruginosa due to their permeability to the outer membrane of the bacteria and the increased resistance of Gram-negative bacteria has become one of the serious problems in Iraq and the world [12]. The reason for this is that they are broad-spectrum antibiotics against Gram-positive and Gram-negative bacteria, in addition, these antibiotics are newly used, and their use is limited to hospitalized patients only because their administration must be mediated by the

physiological solution Normal saline intravenously for a period specified by the treating physician, and this is one of the reasons for the sensitivity of bacteria to them [19-20].

This study attempts to understand the importance of East Asia and the nature of conflicts and conflicts in the region, and how they have affected the formation of balances in the region.

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Table 1: Bacteria isolated according to the sources of isolation

	P. aeruginosa	
	Number	Percentage
Burn infections	96	62%
Wound infections	58	38%
Total	158	100%

Table 2: Percentage of resistance and sensitivity of Pseudomonas aeruginosa

Antibiotic	**Sensitivity rate**	**Resistance rate**
Ampicillin	%0	%100
Ceftriaxone	%14	%86
Trimethoprim	%12	%88
Aztreonam	%20	%80
Norfloxacin	%28	%72
Ciprofloxacin	%13	%87
Piperacillin	%90	%10
Ofloxacin	%80	%20
Meropenem	%100	%0

Imipenem	%100	%0

bioMérieux Customer: Microbiology Chart Report Printed November 9, 2023 10:30:17 AM CST

Patient Name: Patient ID:
Location: Physician:
Lab ID: Baidaa issala 1 Isolate Number: 1

Organism Quantity:
Selected Organism : Pseudomonas aeruginosa

Source: **Collected:**

Comments:	

Identification Information	**Analysis Time:**	7.97 hours	**Status:**	Final
Selected Organism	**Bionumber:**	Pseudomonas aeruginosa 0003213111500352		
ID Analysis Messages				

Biochemical Details

2	APPA	-	3	ADO	-	4	PyrA	-	5	IARL	-	7	dCEL	-	9	BGAL	-
10	H2S	-	11	BNAG	-	12	AGLTp	-	13	dGLU	+	14	GGT	+	15	OFF	-
17	BGLU	-	18	dMAL	+	19	dMAN	-	20	dMNE	+	21	BXYL	-	22	BAlap	-
23	ProA	+	26	LIP	+	27	PLE	-	29	TyrA	+	31	URE	-	32	dSOR	-
33	SAC	+	34	dTAG	-	35	dTRE	-	36	CIT	+	37	MNT	-	39	5KG	-
40	ILATk	+	41	AGLU	-	42	SUCT	+	43	NAGA	-	44	AGAL	-	45	PHOS	-
46	GlyA	-	47	ODC	-	48	LDC	-	53	IHISa	+	56	CMT	+	57	BGUR	-
58	O129R	+	59	GGAA	-	61	IMLTa	+	62	ELLM	-	64	ILATa	+			

Figure 1: VITIK P. aeruginosa

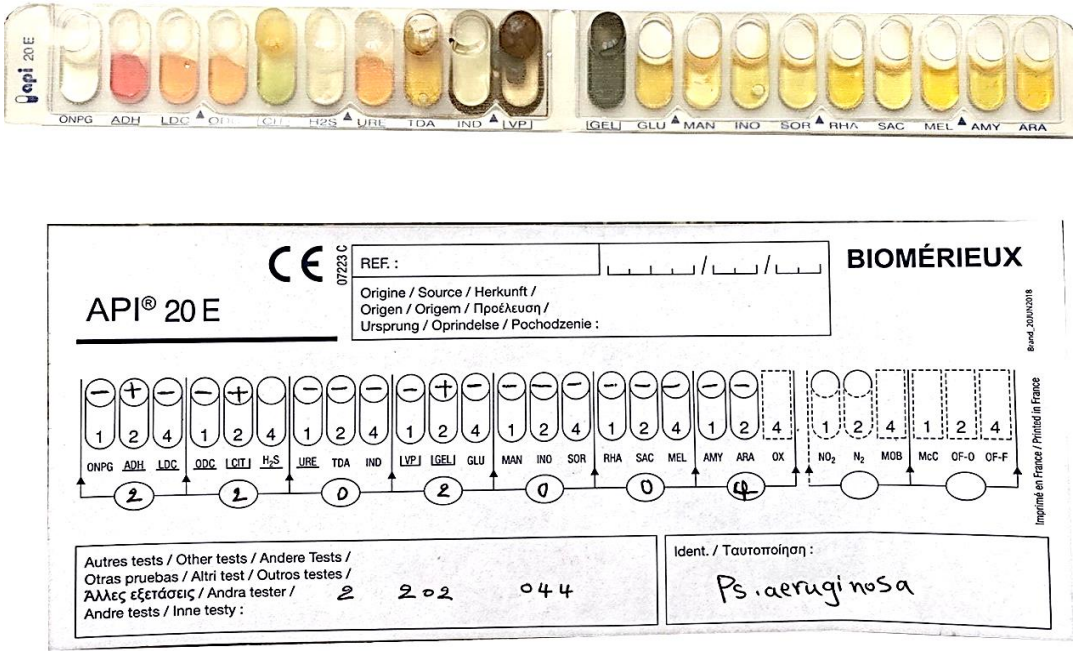

Figure 2: API 20