

Study The Antibiotic Susceptibility Patterns Of *Pseudomonas aeruginosa* Isolated from Hospital Infections

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الخلاصة:

من مجموع 726 عينة مرضية تضمنت مسحات من اصابات الجروح والحروق ومسحات من الاذن والقيح وعينات البلغم و الادرار تم عزل (272) عزلة من بكتريا الزائفة الزنجارية والتي شخصت بالفحوصات البكتريولوجية والبايوكيميائية، وكانت 163 عزلة منها معزولة من الاناث و 109 عزلة من الذكور .

تم عزل 181 (66.54%) عزلة من بكتريا الزائفة الزنجارية بشكل نقي في حين أن 91 عزلة (33.45%) عزل معها انواع اخرى من البكتريا المرضية، منها بكتريا الكلبسيلا بنسبة (76.9%) .
أجري فحص الحساسية للمضادات الحيوية لعزلات الزائفة الزنجارية بأستخدام طريقة كربي بور لستة انواع من المضادات الحيوية المتوفرة .
أظهرت النتائج مقاومة عالية لمعظم المضادات المستخدمة، فكانت المقاومة لمضادات الامينو كلايكوسايد بنسبة (84.6, 95.95, 79.77)% لكل من (الاميكاسين، جينتاميسين، سبروفلوكساسين) على الترتيب، كما اظهرت مقاومة عالية (100%) لمضاد السفالكسين يليه السيفترياكسون (96.32%) بينما كانت الحساسية للبراسيلين (47.79%).

Abstract:

Out of 726 clinical specimens including wound burn, ear, pus swabs, sputum and urine, 272 isolates of *Pseudomonas aeruginosa* were detected by bacteriological and biochemical tests, 163 of these isolates were from females and 109 from males.

181 of the isolates (66.54%) were pure isolates of *P. aeruginosa*, while 91 isolates (33.45%) of *p. aeruginosa* were found mixed with pathogenic bacteria, (76.9%) of these isolates were mixed with *Klebsiella spp.*

Antibiotic sensitivity test for *p. aeruginosa* was done by using Kirby Bauer disc diffusion method to 6 kinds of available antibiotics, it appeared that *p. aeruginosa* isolates were highly resistant to most of the antibiotics. *P. aeruginosa* isolates was found to be more resistant to aminoglycoside antibiotics: Amikacin, Gentamycin and ciprofloxacin (84.6%, 95.95%, 79.77%) respectively, and the highly resistance was to cephalaxine showing 100%

resistance followed by Ceftriaxon (96.32), surprisingly, Pipracillin showed a relatively higher sensitivity (47.79%).

Introduction:

Pseudomonas aeruginosa is gram negative, motile, aerobic rods that grow readily on many types of culture media at 37-42 °C. It is oxidase positive. It does not ferment carbohydrates, but many strains oxidize glucose ^[1].

Pseudomonas aeruginosa is a major human pathogen which can produce infections of wounds and burns, Urinary tract infection, respiratory tract infections and skin infections, *P. aeruginosa* is an important nosocomial pathogen in hospitals because it has many virulence factors such as pili, enzymes like protease, elastase and heat labile phospholipase and toxins like endotoxin (LPS) ^[2,3].

P.aeruginosa is widely distributed in nature and isolated as an opportunistic pathogen in recurrent infections of hospitalized patient and medical staff and is commonly present in moist environments in hospitals especially among burn and wound patient with abnormal host defenses or immunodeficiency ^[4,1].

P.aeruginosa has the ability to resist multiple kinds of antibiotic ^[5], such as Ciprofloxacin (75%) and Ceftriaxon(86%) ^[6].

The present study to see infection caused by *P.aeruginosa*, and antibiotic susceptibility pattern of *P.aeruginosa* isolated from different clinical specimens.

Material and Methods:

A total of (726) clinical specimens including (wound, burn, ear, pus) swabs, sputum and urine samples were obtained from AL-Kindy hospital from January to December-2008.

All specimens were plated on blood agar, MacConky agar, and incubated overnight at 37°C aerobically for 48 hr.^[7]

Pathogenic bacteria that isolated were identified by cell morphology, colony morphology and relevant biochemical tests according to the procedure described, also EPI system was used (Oxide) ^[8].

Antimicrobials susceptibility test was performed to antibiotics (that available in the hospital) on Muller-Hinton agar by the standard disc diffusion method using 6 kinds of discs (Amikacin 30 Mcg, Gentamycin 10 Mcg, Ciprofloxacin 5 Mcg, Ceftriaxon 30 Mcg, Piperacillin 100 Mcg, Cephalexin 30 Mcg) by Kirby Bauer method ^[9,10], compared with standard strain of *P.aeruginosa* ATCC (27853) for antibiotic susceptibility test.

Results:

A total of 272 isolates of *P. aeruginosa* were isolated from (726) clinical samples of which 244 (89.7 %) were from admitted patients and 28 (10.3 %)

were from out patients, 163 isolates (59.93 %) of the isolates were from females while 109 isolates (40.07 %) from males .The clinical specimens including wound burn ,ear ,pus swabs, sputum and urine.

About 91.544 percent (n= 249) of the total samples were from wound, burn swabs, and about 6.25 %(n=17) were from ear swabs, 1.48 %(n =4) were isolated from sputum and 0.367% (n=1) from both pus swab and urine sample.

The incidences of *P.aeruginosa* among specimens are show in table-1.

specimen	No. of isolates	%
Wound,burn swab	249	91.54
Ear swab	17	6.25
sputum	4	1.48
pus	1	0.37
urine	1	0.37

Table-1: Incidence of *P. aeruginosa* from726 clinical specimens.

From 272 isolates ,181 (66.54%) were pure isolates of *P. aeruginosa* and the rest 91(33.45%) were mixed with other pathogenic bacteria, (76.9%) of them were mixed with *Klebsiella spp* and 8 isolates(8.8%), 6 isolates (6.6%) , 4 isolates (4.4%), 3 isolates (3.3%) were mixed with *Escherichia coli*, *Enterobacter spp*, *Staphylococcus aureus* and *proteus spp* respectively as in table-2.

Name of pathogenic bacteria	No. of isolates	%
<i>Klebsiella spp</i>	70	76.9
<i>Escherichia coli</i>	8	8.8
<i>Enterobacter spp.</i>	6	6.6
<i>Staphylococcus aureus</i>	4	4.4
<i>Proteus spp.</i>	3	3.3

Table-2: The number and percentage of *P. aeruginos* isolates mixed with other pathogenic bacteria.

The results in (Table-3) showed that All the isolates of *P. aeruginosa* were resistant to cephalaxine (100%), and also show resistance to aminoglycosides antibiotics, (84.6%) to Amikacin, (95.95%) to Gentamycin and (79.77%) to Ciprofloxacin. The study shows a significantly high resistance to Ceftriaxon (96.32%).

The results also showed that *P. aeruginosais* was more sensitive to Piperacillin (47.79%).

Antibiotics	Resistant isolates		Sensitive isolates	
	No.	%	No.	%
Amikacin	230	84.6	42	15.4
Gentamycin	261	95.95	11	4.04
Ciprofloxacin	217	79.77	55	20.22
Piperacillin	142	52.21	130	47.79
Ceftriaxon	262	96.32	10	3.67
cephalexin	272	100	–	–

Table-3: Antibiotic susceptibility pattern of 272 isolates of *Pseudomonas aeruginosa*.

Discussion:

In the present study the percentage of *P. aeruginosa* isolates were significantly high because 91.54 % (n=249) isolates of the total samples were isolated from wound burn swabs, this goes to confirm that *P. aeruginosa* is a major factor in the etiology of burn wound infection. This finding was agreement with [11,12,13,14], because this bacterium needs a minimal nutritional requirement and it is a nosocomial pathogen that can thrive in moist environment like (water bath, shower), that enable its transfers and spread between different patient in hospital which can produce infections of wounds and burns [1], in addition to that *P. aeruginosa* has many virulence factor that enable its persistence in burn unit of hospital [15].

70 isolate (76.9 %) of *P. aeruginosa* were mixed with *Klebsiella spp* and most of these isolates from burn specimens, a previous study had reported the relationship between this pathogenic bacteria (*Klebsiella*) and epidemic nosocomial infection [16], and this opportunistic pathogenic bacteria can cause many infection such as UTI, skin and wound infection [17].

The isolates showed high antimicrobial resistance to aminoglycosides and this result was agreement with [14,6], the high resistance to aminoglycosids may due to the modification in target site including a mutation that change in ribosomal unit (16 Sr RNA), modification enzyme by the production of aminoglycosids-modifying enzymes includes: Aminoglycosids Phosphotransferases (APHS), Aminoglycoside acetyl transferases (AAGS) and Aminoglycoside nucleotidyl transferases (ANTS) [18].

P.aeruginosa isolates were moderate sensitive (47.79%) to Piperacillin this result is disagreement with Chang *et.al* [19], Piperacillin is more effective against aerobic gram-negative rods, especially *Pseudomonas* [1].

The relatively high resistance of *P.aeruginosa* isolates to commonly used antibiotics, was because most of them still serve as first line drug, and the excessive and randomly consumption of wide broad spectrum antibiotics without proper medical prescription of. So to prevent the spreading of multidrug

resistant bacteria routine sensitivity screening of antibiotics before prescription is suggested, that will help to choose the suitable and effective drug.

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