

## ISOLATION AND IDENTIFICATION OF AEROBIC PATHOGENIC BACTERIA FROM BURN WOUND INFECTIONS

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### Abstract

This study was carried out at Al-Yarmouk teaching hospital in Baghdad, during the period 1/10/2003 to 30/3/2004. A total of 306 specimens were obtained from patients bedding in surgical wards suffering from burn wound infections, the most common single isolated pathogen was *Pseudomonas spp* (36.7%) as well as *Klebsiella spp.* (36.7%), and as mixed isolates (64.7%).

*Pseudomonas spp.* & *Klebsiella spp.* were highly resistant to Cefixime (100%) and sensitive to Norfloxain (67.7%, 56.3%) and Ciprofloxacin (41.7%, 53.8%) in this study.

Key words: burn wound–infection

### Introduction

Burn wound infections are one of the most important and potentially serious complications that occur in the acute period following injury (1, 2). These wounds are subsequently colonized with microorganisms, including gram-positive bacteria, gram-negative bacteria and yeasts, which derived from the host's normal flora (gastrointestinal flora, upper respiratory flora) and from the hospital environment (3, 4, 5, and 6).

Microorganisms may also be transferred to a patient's skin surface via contact with contaminated external environmental surfaces, water, fomites, air, hydrotherapy treatment, and the soiled hands of health care workers (7, 8).

The risk of invasive burn wound infection is influenced by the extent and depth of the burn injury, various host factors, and the quantity and virulence of the microbial flora colonizing the wound (8). The common burn wound pathogens are *Pseudomonas aeruginosa*, *Klebsiella spp.* and *Staphylococcus aureus*, which produce a number of virulence factors that are important in the pathogenesis of invasive infection (9, 10, and 11).

The aim of this study was to determine the causative microorganisms of burn wound infection and antibiotic sensitivity.

### Method and material

1. About 306 specimens were collected from Al-Yarmouk Teaching Hospital in Baghdad, during the period from

1/10/2003–30/3/2004. The specimens were taken from patients undergoing surgical operation or burn in surgical wards.

2. All swabs obtained were cultured directly on blood agar and MacConkey agar for isolation of aerobic bacteria. Cultured plates were examined after overnight incubation at 37°C, if no growth obtained on plates they were re-incubated for another 24 hrs. (12).
3. Identification of pathogenic bacteria was based on gram stained smear, biochemical test and culture media (13).
4. Antibiotics sensitivity was carried out by using Muller-Hinton medium, 5-10 colonies of each isolate were picked up with sterile loop and suspended into 2.5ml of sterile distilled water, suspension was taken by a sterile cotton swab then streaked the surface of all the plate in three different planes. By using the sterile forceps, the disks were placed on the inoculated plates and pressed firmly but gently into surface of the agar and then incubated at 37°C for 18-24 hrs. After incubation the diameter of complete inhibition zones were measured using reflected light and ruler (14).
5. The statistic method used for analysis the result of this study was Chi-square test.

### Results & Discussion

About 306 swabs were collected from burn-wound patients attending the surgical wards at Al- Yarmouk teaching hospital. The identification and differentiation of bacteria isolates from burn- wound swabs were done depending on Bergey's manual of

determinative bacteriology which included : Cultivation on suitable media, gram stain and biochemical tests.

Table (1) shows that *Pseudomonas spp.* (36.7%) as well as *Klebsiella spp.* (36.7%) the most common single isolated pathogenic bacteria from burn wound infections. There is significant difference between them ( $p < 0.05$ ). This is agreement with Kehined *et.al* (13) who found that *Klebsiella spp.* (34.4%) and *Pseudomonas spp.* (29.0%) were the most common isolate from infected burn wounds and in agreement to other studies which report *Staphylococcus aureus* as predominant organism (15, 16).

Also, *Pseudomonas spp.* & *Klebsiella spp.* were the most common mix growth isolates (64.7%) and *Pseudomonas spp.* & *E. coli* (15.7%) as shown in Table (2). There is significant differences between them ( $p < 0.05$ ). From Table (1&2) the total number of mix growth (102) more than single growth (98), because burns and wounds are suitable site for bacteria multiplication and infection, due to larger area involved and longer duration of patient stay in the hospital (16), in addition to contamination of hospital environment especially in the operating theatre, patient beds, medical instrument and hand carriers (11).

In this study, two highly frequent isolates (*Pseudomonas spp.* & *Klebsiella spp.*) were tested for the sensitivity to (11) available antibiotics used in the hospital. Fig.(1) showed that *Pseudomonas spp.* & *Klebsiella spp.* were highly resistant to Cefixime (100%), whereas, these bacteria were show sensitivity to Norfloxain (67.7%, 56.3%) and Ciprofloxacin (41.7%, 53.8%) in our study.

On the other hand, these bacteria showed different degrees of resistance to (Augmentine, Chloramphenicol, Ceftazidine, Amikacin, Cotrimoxazole, Tetracycline, Gentamicin and Cephotaxime). Recent study noted that the resistant occur because of widespread and misuse of antibiotic, especially in the developing countries, the resistance profile of microorganisms has been altered significantly, also it could be attributed to several mechanisms, mostly related to antibiotics over use (17). The outcome conclusions of this study were as follows:

- 1- High rate of infected wounds & burns were *Pseudomonas spp.*, *Klebsiella spp.* as single isolates (36.7%) and as mixed isolates (64.7%).
- 2- *Pseudomonas spp.* & *Klebsiella spp.* were highly resistant to Cefixime (100%) and sensitive to Norfloxain (67.7%, 56.3%) and Ciprofloxacin (41.7%, 53.8%) in this study.

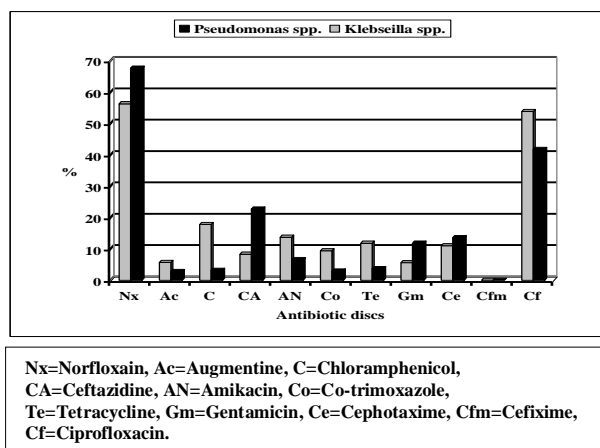
**Table (1)**  
**Types of single pathogens isolated from patients suffering Wound & burn infections.**

Pathogens	Frequency	%
<i>Pseudomonas spp.</i>	36	36.7
<i>Klebsiella spp.</i>	36	36.7
<i>E. coli</i>	13	13.3
<i>Staphylococcus aureus</i>	10	10.2
<i>Proteus spp.</i>	3	3.1
<b>Total</b>	<b>98</b>	<b>100</b>
<b>No growth**</b>	<b>106</b>	

\*\* No growth of pathogens on plates were seen.

**Table (2)**  
**Types of mixed pathogens isolated from patients suffering wound & burn infections.**

Pathogens	Frequency	%
<i>Pseudomonas spp.</i> & <i>Klebsiella spp.</i>	66	64.7
<i>Pseudomonas spp.</i> & <i>E. coli</i>	16	15.7
<i>Pseudomonas spp.</i> & <i>E. coli</i> & <i>Klebsiella spp.</i>	7	6.9
<i>Klebsiella spp.</i> & <i>E. coli</i>	5	4.9
<i>Pseudomonas spp.</i> & <i>Proteus spp.</i>	3	2.9
<i>Pseudomonas spp.</i> & <i>Klebsiella spp.</i> & <i>Staphylococcus aureus</i>	3	2.9
<i>Proteus spp.</i> + <i>E. coli</i>	1	1
<i>Pseudomonas spp.</i> & <i>S. aureus</i>	1	1
<b>Total</b>	<b>102</b>	<b>100</b>



**Fig. (1): The comparison of antibiotic sensitivity pattern between *Pseudomonas* spp. & *Klebsiella* spp.**

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### الخلاصة

أجريت هذه الدراسة في مستشفى اليرموك التعليمي في بغداد خلال الفترة 2003/10/1 - 2004/3/30. وقد تم فيها الحصول على 306 عينة من الأشخاص الراقدين في ردهات الجراحة. أظهرت الدراسة أن العزلات المرضية المفردة الأكثر شيوعاً التي تم الحصول عليها من الجروح و الحروق هي *Pseudomonas spp.* (36.7%) وكذلك *Klebsiella spp.* (36.7%) في حين كانت العزلات المرضية المختلطة الأكثر شيوعاً هي *Pseudomonas spp & Klebsiella spp.* (64.7%).

وجد أن *Pseudomonas spp.* و *Klebsiella spp.* الأكثر مقاومة للمضاد Cefixime (100%) والأكثر حساسية تجاه المضادين Norfloxain (67.7%)، Ciprofloxacin (56.3%) و (41.7%) ، (53.8%) المستخدم في الدراسة.