Detection Antimicrobial Suscep Tibility Patterns of Bacterial Species Isolated from Burns and Wounds Infections in Basrah Hospitals

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Abstract

Burn and wound infection is one of the most frequent serious sicknesses caused by pathogen, chiefly by both gram positive and gram negative bacteria.This study was carried out to identify 25 bacteria isolated from burns and wounds surgical belong to the species : *(Staphylococcus aureus,Staphylococcus lentus ,Staphylococcus intermedius,Staphylococcus lugdunensis,Pseudomonas aeruginosa ,Pseudomonas oryzihabitans,Pantoea spp., E.coli ,Rhizobium radiobacter,Ochrobactrum anthropic,Burkholdria cepacia,Sphingomonas pauci- mobilis,Klebsiella pneumoniae,Aeromonas sobria.. Staphylococcus* 9(36%) was the most dominant organism,followed by *Pseudomonas* 6(24%).Antibacterial activity of some antibiotics was investigated against bacterial isolates . the data demonstrate the most commoly isolated from burns and wounds surgical were *Staphylococcus* followed by *Pseudomonas* .All bacterial isolates revealed high resistance to antibiotics were used, Whereas *Staphylococcus* aureus revealed resistance for three antibiotic: Amikacin ,Nitazo- xanide,Neomycin . *Pseudomonas aeruginosa* revealed resistance for four antibiotic: Neomycin,Amoxicillin/Clavulanic acid, Cepha- lothin ,Cefotaxime. *Pantoea spp* revealed resistance for five antibiotic: Neomycin,Trimethoprime,Amoxicillin/Clavulanic acid, Cephalothin ,Cefotaxime . *E.coli* revealed resistance for four antibiotic: Neomycin ,Trimethoprime,Amikacin,Cephalothin.

Key words: *Staphylococcus **;** wounds**;** infections**;** Neomycin*

Introduction

Burn wound infections are a major medical problems in all areas of the world [11] They can be caused by heat,scalds, , electricity, chemical agents [17] . Infections of burns caused by pathogenetic bacteria is one of the most frequent hospital problems in world, especialy in modern countries [3] . Hospital acquired infection in burn patients might be caused by exogenous or endogenous. exogenous infection is obtained during exposure to the hospital workers or medical devices ,hospital environment, while Endogenous infection is induced by microorganisms present as the normal flora of the patients [22]. Infection is still source of mortality and morbidity in burn patients. It is assessed that approximately 75% of the mortality associated with burn infections is related to sepsis particularly in modern countries [(24,2).]

Burn injury is one of the most frequent and destructive forms of trauma. Patients with serious thermal injury require specialized care to minimise mortality and morbidity [13]. Human skin surface is the main layer that represents the natural protection of the body tissues from the invasion of potential pathogens, and the occurrence of burns or injury in the skin can lead to destroy and destruction of these tissues and may happen infections of bacteria transmitted to the blood and internal tissues, which is a proteins-rich environment and encourage the growth of microorganisms that play an important role in the pathogenicity [16] .

Burn injuries of patients are high risk of infections for a variety of reasons. For instance, immune compromizing effects of burns, available exposed body surface, prolonged hospital stay, invasive diagnostic and therapeutic procedures [21] .

Wounds are defined as a crash in the defensive function of the skin and damage of continuity of epithelium with or without loss of underlying connective tissue. Tainted wounds are probably to be more grievous,

allergic and odoriferous, resulting in increased disquiet and malaise for the patient [15]. Surgical wound infection is determined as festering execute from the surgical wound. it is distinguished by inflammation encircling periwound area. Surgical wound infections are the second most common cause of nosocomial infections[6,7]. Microorganisms that are liable for surgical wound infection cause activation of immune system results tissue destruction and inflammation. [12].

The dominant microorganisms that associated with wounds infections comprise multi -drug resistant gram –positive and gram-negative bacteria, the most common microorganisms are *Staphylococcus aureus* which from different studies have been found to form 20-40% and *Pseudomonas aeruginosa* 5-15% ,*Escherichia coli*, *Klebsiella spp* and *Acinetobacter spp*. of the nosocomial infection, with infection chiefly following surgical operation and burns [8,25,26]. *Pseudomonas aeruginosa* is one of the significant species among the genus *Pseudomonas*. *P. aeruginosa* is widespread distribution in nature, its virulence and its high antibacterial resistance. *P. aeruginosa* is nosocomial infection pathogen and an opportunistic, that causes diseases in immuno-compromised individuals [4,23] .

The aim of this study is to isolate and characterize bacterial species causing burns and wounds infections from patients admitted in Basrah hospitals and determination of the antimicrobial susceptibility of bacterial isolates.

Materials and Method

Collection of specimens

Fifty three swabs have been collected from patients of burns and wounds surgical units with different sex and ages and dissolved into 2ml brain heart infusion broth media after then transported to bacteriological lab and incubated at 37°C for 48 hours.transported.samples comprise 25post operative wounds and 28 burns from two hospitals: Al-Fayhaa General hospital, Al-Basrah General hospital.

Isolation and characterization of bacterial isolates

The swabs sticks used for collection of specimens were streaked on Nutrient,MacConkey, Blood and Mannitol salt agar and incubated overnight at 37°C. growth of bacteria have been identified by appearance of colonies,blood hemolysis ,microscopic examination by Gram stained .Then bacterial isolates were identified at level of species by using Vitek-2 compact was performed with ID-GN,ID-GP cards, according to the manufacturer's instructions.

Antimicrobial Susceptibility tests

The antimicrobial susceptibility tests have been accomplished as present in Kirby –Bauer (1966) technique using nutrient agar and different single antimicrobial discs fitted out commercially. Zones of inhibition around the discs have been measured by millimeter(mm) using a metric ruler as present in clinical laboratories standards institute (2011).The antibiotics tested were: amikacin30µg, cefotaxime30 µg,cephalothin 30µg, tobramycin 10µg ,trimeth- oprim5µg ,neomycin30 µg, nitazoxanide30µg, imipenem 10µg ,meropenem 10µg , amoxicillin/clavulanic acid20/10µg,nalidixic acid30µg.

Results

Out of 53patients of burn and surgical wounds,50cases infected with bacteria.these isolates were identified to Gram negative and Gram positive bacteria by using conventional methods.whereas the isolates exhibited differential pattern on blood agar and some of isolates ferment lactose when grown on MacConkey media. The identification results with Vitek$_2$ compact system were grouped in fig 1.Among 50 bacterial isolates ,25 isolates identified to species(*Staphylococcus aureus,Staphylococcus lentus,Staphylococcus intermedius ,Staphylo- coccus lugdunensis,Pseudomonas aeruginosa ,Pseudomonas oryzihabitans,Pantoea spp., E.coli,Rhizobium radiobacter,Ochrobactrum anthropic,Burkholdria cepacia,Sphingomonas paucimobilis,Klebsiella pneumoniae,Aeromonas sobria)* .

The study revealed the commonest organism was *Staphylococcus* with percentage 36% (9 isolates) followed by *Pseudomonas* 24%(6 isolates), *E.coli* 8% , *Pantoea* 8% with (2 isolates for each), *Klebsiella* 4%, *Rhizobium* 4%, *Ochrobactrum* 4%, *Burkholdria* 4%, *Sphingomonas* 4% *Aeromonas* 4% with (1 isolates for each).

The results demonstrated that the bacteria isolates characterized at species level by Vitek$_2$ compact system was separated into four groups based upon the probability of accurate identification as follows:8(32%) isolates with probability of accurate identifycation(96-99%),4(16%)

isolates with (93 - 95%),7(28%) isolates with good(89- 92%),6(24%) isolates with (85 - 88%) as show in fig 2 .

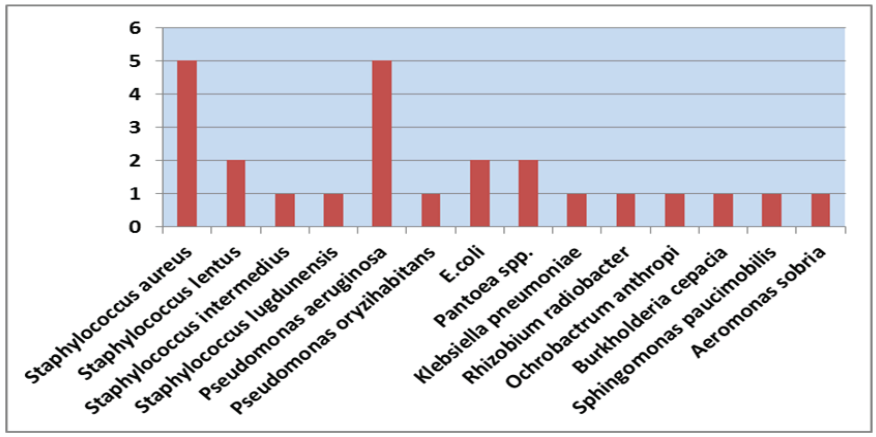

Fig 1: Bacterial species identified by Vitek 2 compact system

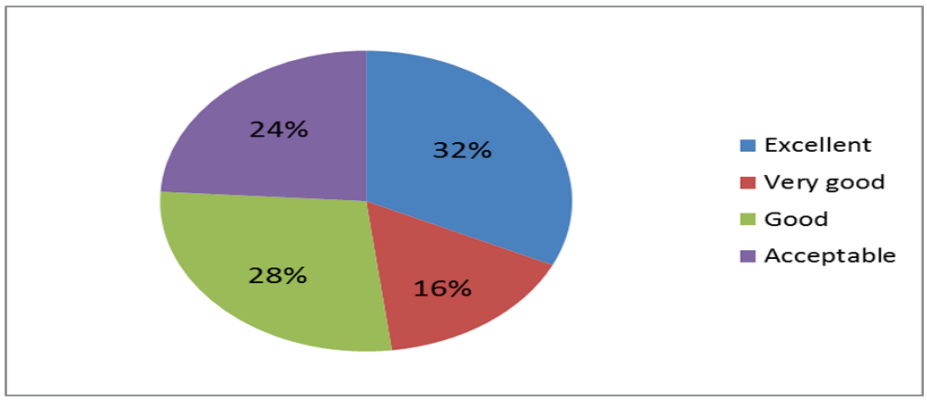

Fig 2:Probability of identification of bacterial spp. by Vitek2 compact

Antibiotic susceptibility patterns

Staphylococcus aureus

The present study showed that *Staphylococcus aureus* exhibited the highest resistance against antibiotics:Amikacin,Nitazoxanide,Neomycin,while they were sensitive to antibiotics Tobramysin ,Imipenem as show in fig 3.

Pseudomonas aeruginosa

The most effective antibiotics on *Pseudomonas aeruginosa* were Tobramysin ,Imipenem while the highest resistance were to Neomycin,Amoxicillin/ Clavulanic acid, Cephalothin ,Cefotaxime as show in fig 4.

Pantoea spp.

The study revealed that *Pantoea spp.* exhibited the highest resistance against antibiotics: Neomycin,Trimethoprime,Amoxicillin/Clavulanic acid, Cephalothin ,Cefotaxime while they were sensitive to antibiotics Tobramysin ,Imipenem,Amikacin as showed in fig 5.

E. coli

In our study ,*E. coli* exhibited the highest resistance against antibiotics: Neomycin,Trimethoprime,Amikacin,Cephalothin while they were sensitive to antibiotics Tobramysin,Imipenem as showed in fig 6.

Antibiotics resistance for *Staphylococcus aureus and Pseudomonas aeruginosa*

The results revealed that both *Staphylococcus aureus* and *Pseudomonas aeruginosa* exhibited high resistance against antibiotic Neomycin while both of

them showed sensitive toTobramycin ,Imipenem.

Discussion

Bacterial infection of wounds is a grave problem in hospital ,chiefly in surgical usage where the place of a sterile operation can become contaminated and subsequently infected [20] In this study , the majority isolated organisms from burns and wounds surgical were *Staphylococcus* followed by*Pseudomonas* .the reasons for this high diffusion may be due to factors associated with the acquirement of nosocomial pathogens in patients with long term hospitalization,prior administration of antimicrobial agents, complicating illnesses , recurrent, ,or the immunosuppressive effects of burn these results are not agreement with the work of [18] but agreement with results from previous study [14].Findings from study accomplished at hospital in Nigeria revealed that the most common microorganism were *Staphylococcus aureus*(25%) *and Pseudomonas aeruginosa* (20%) [1] .*Pseudomonas aeruginosa* in this study was resistance to four antibiotics as showed in Fig.4.Aprimary cause of drug resistance in gram negative bacteria is their ability to generate extended spectrum β-lactamase [19].In results showed that most bacterial isolates exhibited multi drugs resistant.*Pseudomonas aerogenosa* is adapted to the habitat of hospital due to biofilm construction that provides long survival advantage for the pathogens,and prevent elimination by the host immune system or antibacterial drug treatment [10].

Conclusion

The most common causative agents of wound,burn infections and antibiotics resistance in the present study were *Staphylococcus aureus* and *Pseudomonas aeruginosa* respectively,a lso the study observed that *Staphylococcus aureus* and *Pseudomonas aeruginosa* were multidrug resistant.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Departmeпt of biology, College of Science, University of Basrah, Iraq and all experiments were carried out in accordance with approved guidelines.

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