Detection of the Presence of Staphylococcus Aurous Isolated from Patients with Burn Wounds and the Extent of their Ability to Resist Some Antibiotics

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Abstract
The present study highlights the isolation, biochemical characterization, antibiotic Sensitivity to the Staphylococcus aureus and it's one of the pathogens that pose a great danger to human life and health personnel in hospitals, especially MRSA. On this basis, we chose to have the study of our research specialized in S.aureus bacteria, which we isolated from burn patients, as we found that in many cases of burns there was the presence of bacteria S. aureus after it was diagnosed by biochemical tests and vitek system, and we tested the effect of some antibiotics on the resistance of S. aureus isolated from burns of some patients represented by (types of antibiotics).The antibiotic ceftriaxone (CIP) gave the least effect on these bacteria while both (CIP),(LEV),(TE), (Do) and streptomycin (s) gave Great resistance against these bacteria.
Keywords: Staphylococcus aureus, antibiotics, burns.

1. Introduction

Bacterial pathogens are colonized on animate and inanimate objects, but most people do not recognize that among the general things, including those that cause a lot of damage and pose a threat to human health [1].The skin is the principal line of guard in the human, defense system, and when a breach occurs for some reason, it will be susceptible to infection by microorganisms that are located near the breach site. If this barrier is broken, the host is immediately disadvantaged, as the burned skin creates a nutrient-rich niche that becomes a breeding ground for endogenous and exogenous microbial infections [2]. In addition to weakening the skin barrier, the host's immune system can also become dysfunctional as the burned area cannot heal or defend against harmful microorganisms [3]. Studies indicate that a large proportion of deaths resulting from fires are estimated at about 180,000 people who lose their lives every year all over the world. Infection has been found as the underlying cause of death in 42–65% of hospitalized burn victims, which stems from the immune compromised state of the victim [4]. Overall, this highlights the need for unambiguous burn wound models that not only replicate the infective setting, i.e., infections and the many host responses elicited, but also provide methods for the testing of novel therapies. The tissue severe damage and complex milieu of biomolecules provide an ideal setting for microbial invasion. Staphylococcus aureus is a well-known opportunistic pathogen that causes infections of the skin and soft tissues. Gu et al. [5]. This gram-positive bacterium is present in about 30% of the population and often causes community and hospital-acquired infections [6]. Burn patients are at a high risk of contracting S. aureus due to their immune compromised state. S. aureus is the second most prevalent pathogen known to infect burn victims, behind Pseudomonas aeruginosa. It is one of the first infections to colonize the site after the trauma [7]. S. aureus infection is dangerous for a variety of reasons, including its capacity to create biofilms and evade the human immune system. S. aureus is usually identified by Toll-like Receptors (TLRs) 2 and 9, which then activate the NF-B cascade, which kills the invading bacterium [8]. S. aureus biofilms, provides protection from host recognition and pathogen phagocytosis by encapsulated bacteria with an extracellular matrix. Furthermore, virulence factors produced by S. aureus impair phagocytic and opsonization activity, resulting in impaired macrophage and neutrophil function [9]. This emphasizes the burn victim's dangerous situation, as they must deal not only with a conking vulnerable system as it relates to the injury, but also with a bacterium that has evolved to escape the same weakened host defense system [3, 10].

2. Materials & Methods

2.1: Sample collection

During the period from june-2019 to december-2019, 30 swab were collected from patients with burn wounds.

2.2. Isolation and purification of bacterial isolates:

Swab samples were cultured in brain heart infusion broth and incubated at 37°C for 24 hours. The broth media that resulted in positive growth were streaked over mannitol salt agar, blood agar plates, and MacConkey

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agar plates and incubated for 24 hours at 37 °C. The colony that gave the Staphylococcus aureus characteristic was chosen and sub-cultured into nutrient broth, incubated for 24 hours at 37 °C. Pure colonies were then streaked on nutrient agar slants, cultured for 24 hours at 37°C, and then stored in the refrigerator until needed for subsequent experiments.

2.3: Microscopic Examination:

2.3.1: Gram stain:

Gram-stain was used to evaluate all bacterial isolates; slides were made from a 24 hour pre-grown colony and stained using the Gram-stain procedure, then viewed under the microscope for Gram positive cocci grouped in clusters or with a grape-like appearance [11].

2.3.2: Biochemical Tests

All bacterial isolates were examined by Oxidase test, Catalase test, Mannitol Fermentation, Detection of Hemolysis on Blood agar and Coagulase test [11, 12].

3: Confirmatory test

The VITEK® 2 system Version 07.01 equipment was used to diagnose the bacteria with great accuracy using the Gram-positive bacteria identification test card (VITEK GP ID-P Reference number 21342, bioMérieux, USA) for staphylococcus aureus identification.

Antimicrobial Susceptibility Test

Antimicrobial susceptibility testing was performed on the verified S. aureus isolates. McFarland standard 0.5 was used to detect the susceptibilities of isolates using ten antimicrobials [13].

3. Statistical Analysis

4. Results and Discussion

3.1. Isolation and identification

A total of thirty fife swab samples was collected from burn wounds (35 samples) during the period from june-2019 to december-2019, 35 swab were collected from patients with burn wounds. Out of 35 samples, 21 (60%) samples were positive for staphylococcus aureus bacterial growth that Identification by using biochemical tests and confirmatory by the VITEK® 2 system.

The biochemical identification was given a characteristic of Staphylococcus aureus When cultivated on nutrient agar, small, spherical, convex colonies (1-4 mm) in diameter with a sharp border, Gram positive when stained with Gram's stain, catalase positive, oxidase negative, ferment mannitol with changing the color of indicator from red to yellow and colonies surrounded by patches of clear hemolysis on blood agar, Figure (1). Blood agar plates are one of the most used methods for isolating and ident

Identifying S. aureus and other medically significant Gram-positive bacteria and are especially useful in recognizing ß-hemolysis patterns. When cultivated on mannitol agar, all of these isolates can ferment mannitol and change the color of the indicator from red to yellow by generating acid, resulting in a positive coagulase production test result.

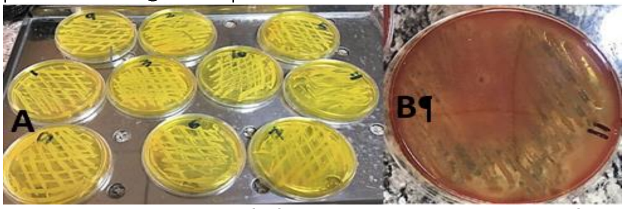

Figure (1) (A) Staphylococcus aureus is Mannitol Fermentation on Mannitol agar plate, (B) Show **β***-hemolysis on Blood agar.*

3.2: resistance of antibiotic

All the bacterial isolates from burn wounds were tested for their antibiotic susceptibility behavior (Table 1 and Figure 2). A high level of resistance against ceftriaxone (CRO) (76.19%) was observed.47.61% were resistant for both Aztreonam (ATM) and Cefotaxime (CTX), 4.76% for both Trimethoprim (TMP) and Oxytetracycline (T) and didn't given any resistant for Streptomycin(S), DoxycyclineDO),Tetracycline(TE),Levofloxacin(LEV)and Ciprofloxacin(CIP).

Table (1): Staphylococcus aureus resistance of antibiotic

No. sample	Streptomycin (S)	Doxycycline (DO)	Aztreonam (ATM)	Trimethoprim (TMP)	Cefotaxime (CTX)	Tetracycline (TE)	Levofloxacin (LEV)	Oxytetracycline (T)	Ceftriaxone (CRO)	Ciprofloxacin (CIP)
1	21	30	8	31	X	25	36	17	X	33
2	24	30	16	31	X	25	35	18	10	33
3	24	34	15	33	8	25	38	16	8	34
4	21	30	10	30	10	21	46	12	X	31
5	27	34	X	44	8	31	34	24	X	31
6	26	31	10	33	12	23	35	22	7	33
7	27	33	X	38	X	34	37	25	X	32
8	25	33	X	36	12	32	35	26	X	29
9	23	31	X	41	X	30	33	23	X	29
10	27	30	X	38	7	29	33	21	X	30
11	23	30	10	33	11	23	36	12	X	34
12	48	58	10	34	8	25	56	12	X	36
13	33	28	13	35	X	24	32	14	X	31
14	25	32	9	34	7	22	36	13	X	34
15	27	32	25	23	7	26	36	21	x	31
16	10	30	10	18	10	30	28	28	8	24
17	18	20	X	X	X	16	28	11	X	23
18	19	25	X	18	X	22	24	18	8	20
19	8	12	X	12	X	10	20	10	X	15
20	6	10	X	8	X	8	20	X	X	18
21	20	20	X	24	X	28	20	26	X	28
%	0%	0%	47.61%	4.76%	47.61%	0%	0%	4.76%	76.19	0%

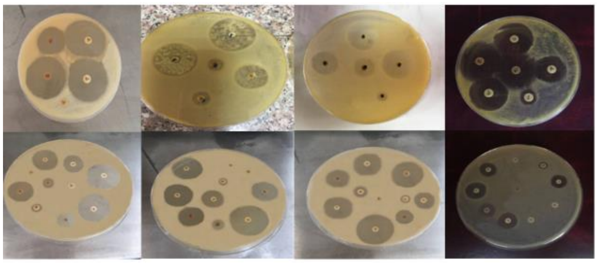

Figure (2): Staphylococcus aureus resistance of antibiotic.

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