STAPHYLOCOCCUS AUREUS;

Prevalence in burns patients.

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ABSTRACT… Objective: To determine the prevalence of Staph. aureus in burn patients. **Setting:** Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi. **Period:** July 2002 to December 2002. **Material and Methods:** Out of 52 patients 23 (44%) were found infected by 41 strains of S. aureus in which 10 strains were Methicillin resistant. **Results:** All Methicillin sensitive and resistant strains were sensitive to Vancomycin and Chloramphenicol. Other effective drugs against MSSA were Imipenem (93.5%), Cephalothin (77.5%), Clindamycin (68%) while MRSA strains were highly resistant to all other drugs. **Conclusions:** Gram positive heavily colonize the wound at initial days following burn injury. Once Staph aureus specially MRSA establishing in burn unit, it is very difficult to eradicate these bacteria from burn unit. It is therefore all efforts must made to prevent burn patients from infection specially Staph. Aureus infection, by establising infection control team these burn units.

Key words: Burn, Wound, Infection, Staph.aureus, MRSA

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INTRODUCTION

Normal skin is effective barrier that prevent penetration of surface bacteria[1]. The devitalized tissue and moist burn is favorable for colonization and proliferation of micro-organisms and subsequent infection, therefore the potential risk of burn wound sepsis persist until complete wound healing[2].

The systemic immune responses are altered by burning and defect occurs in cellular arm as well as in humoral arm of immunity that result in imbalance in the normal equilibrium between bacteria and host resistance Contamination of the burn wound is the initial and most important mode for the development of sepsis. The other risk factor for burn wound sepsis is prolonged hospital stay that result in nosocomial infection which occurs between patients due to spread of organism by air born, direct contact between patients and indirectly by visitors. Health care workers hands are also major vehicle of transmission of infection. Immuno comprising effects, invasive diagnostic and therapeutic procedure and use of broad spectrum antibiotic also contribute to develop nosocomial infection[2-4].

Gram positive bacteria that normally found in deep areas of skin like sweat glands and hair follicle may survive the heat of initial injury, those heavily colonize the wound within a single post burn day [5] The frequency of infection by Staphylococcus aureus has increased during the last three decades and their susceptibility pattern have changed. Many strains becoming resistance to the antibiotic of choice and some have even become multi-resistant to three or more classes of antibiotics[6].

MATERIAL AND METHODS

This study was conducted between July 2002 to December 2002 at the Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi.

A total of 52 patients with infected burn wound with irrespective of age, sex, while degree and percentage of burn were registered for this study. These patients were admitted since more than last three days of admission in burn unit of 3 different hospitals of Karachi.

A total of 170 burn wound swabs were collected

Total patients	Total Isolates	Patients infected by S.aureus;	Total S.aureus	Total MSSA	Total MRSA
52	190	23 (44%)	41 (21.6%)	31 (76%)	10 (24%)

Table-I. Summary of the Patients and isolates

following a thorough inspection and examination of an infected area of each patient. These swabs were immersed in Stuart's transport medium, transported to laboratory, cultured on Blood agar, MacConkey's agar and Nutrient agar. Cultured media were incubated at 37°C for overnight.

Following incubation isolates of Staph. aureus were identified by their colonial morphology, Gram's staining and were confirmed by certain biochemical tests like Catalase test, Coagulase test (slide and tube method), Mannitol fermentation test and Novobiocin sensitivity test.

According to National Committee for Clinical Laboratory Standards Guidelines, susceptibility test of all isolates of Staph. aureus was performed using different antimicrobial agents by Kirby Bauer method[7-8].

RESULTS

Table-I shows the summary of patients,cultures and isolates .Out of total 52 patients 23 (44%) were found infected by S.aureus. Out of 190 isolates 41(21.6 %) were S. aureus in which10 (24%) were MRSA.

DISCUSSION

After the initial period of shock, infection is the major complication in burn. Staphylococci were the predominant cause of burn wound infection in pre antibiotic era. It remains an important pathogen at present and is the second most common isolate in burn wound infection[9].

Staph.aureus is a versatile human pathogen and continues to be an important cause of nosocomial infection. Recently a marked increase in number of

Name of antibiotic	Disc content	Sensitivity	Resistant
Vancomycin	30 µg	31 (100%)	-
Chloramphenicol	30 µg	31 (100%)	-
Imipeneme	10 µg	29 (93.5%)	02 (06.5%)
Clindamycin	02 µg	21 (67.7%)	10 (32.2%)
Augmentin	30 µg	18 (58%)	13 (42%)
Amikacin	30 µg	17 (54.8%)	14 (45.2%)
Cephalothin	30 µg	24 (77.5%)	07 (22.5%)
Gentamycin	10 µg	03 (9.6%)	28 (90.3%)
Ciprofloxacin	05 µg	02 (06.5%)	29 (93.5%)
Cefuroxime	30 µg	18 (58%)	13 (42%)
Amoxacillin	10 µg	03 (9.6%)	28 (90.3%)
Clarithromycin	15 µg	14 (45.2%)	17 (54.8%)

Table-II. Sensitivity pattern of 31 isolates of methicillin sensitive S.aureus

Name of antibiotic	Disc content	Sensitivity	Resistant
Vancomycin	30 µg	10 (100%)	-
Chloramphenicol	30 µg	10 (100%)	-
Clindamycin	02 µg	04 (40%)	06 (60%)
Clarithromycin	15 µg	02 (20%)	08 (80%)
Gentamycin	10 µg	02 (20%)	08 (80%)
Amikacin	30 µg	01 (10%)	09 (90%)
Ciprofloxacin	05 µg	-	10 (100%)

Table-III. Sensitivity pattern of (n=10) isolates of methicillin resistant Staph;. Aureus

hospital infection due to MRSA has been reported in many countries[10].

The prevalence of MRSA infection varies widely from one geographical location to another, from hospital to hospital and over time. Once a clone of MRSA is introduced into a hospital it can spread, causing outbreaks[6].

In present study the prevalence of Staph.aureus was 21.6% in burn wounds of patients, that is in accordance with several studies[8,11-14]. This prevalence of Staph.aureus was relatively higher than the other studies[9-15] where it was ranging 9-14%. This prevalence of Staph.aureus was markedly lower than the studies conduced by Edward and Greenwood (2003)[16], Appelgren et al (2002)[17] and Nakhla and Sanders (1991)[18] where it was ranging from 69% to 75%.

Knowledge of the organisms colonizing a wound will prove useful in choosing an antibiotic regimen, while awaiting definitive result of wound cultures[19].

Since 1980 Vancomycin has been uniformly effective antibiotic available for serious Staphylococcal infection. The laboratory reports of low susceptibility or partial resistance of MRSA to Vancomycin was 1.4% in burn wound infection in 1993, that act as a warning and suggested the possibility of developing total resistance in near future, but it can not be labeled as Vancomycin resistant[10].

In present study Vancomycin and Chloramphenicol was the highly (100%) effective drugs against Staph. aureus that is in accordance with other studies Song et al (2001)[20] and Revathi et al (1998)[21].

Imipenem showed high activity rate (93%) while Cephaloxin and Clindamyin were moderately active (67% and 62% respectively) while only 43% strains were sensitive to Amikacin in present study.

Amoxicillin, Ciprofloxacin and Gentamycin were highly ineffective (88-95%) against Staph.aureus while Clarithromycin, Cefuraxime, Amikacin and Augmentin were moderately inactive (50-59%) against these organisms that is in accordance with other studies[20-21].

Antimicrobial drugs shows less effectiveness after the arising of resistance mechanism in clinical prevalent pathogens[22].

There is no antimicrobial to which resistance had not eventually appeared[23]. Bacterial resistance to antimicrobial agents is an important public health problem in both the developing and the developed countries, in which many of these organisms are multiple drug resistant i.e., resistant to two or more antibiotics to which the bacteria was usually susceptible[24].

High frequency and nature of antibiotic resistance may be due to over usage of commonly used antibiotics such as Ciprofloxacin, Gentamicin and Amikacin as well unavailability and high cost of preferred antibiotics of choice[9].

CONCLUSIONS

Normal skin is effective barrier that prevent penetration of surface bacteria. The devitalized tissue and moist burn is favorable for colonization and proliferation of micro-organisms and subsequent infection, therefore the potential risk of burn wound sepsis persist until complete wound healing.

Gram positive bacteria found in the depth of sweat glands and hair follicle may remain alive following the heat of initial injury, these bacteria heavily colonize the wound at initial days following injury. Once Staph aureus specially MRSA establishing in burn unit, it is very difficult to eradicate these bacteria from burn unit. It is therefore all efforts must made to prevent burn patients from infection specially Staph. Aureus by establishing infection control unit in these burn units.

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The difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather a lack of will.

Vince Lombardi