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Aerobic Bacterial Isolates from Burn Wound Infection Patients and their Antimicrobial Susceptibility Pattern

Authors

Sangeetha C Patil*, Mariraj Jeer, Krishna S

Department of Microbiology, Vijaya Nagar Institute of Microbiology, Ballari Karnataka, India

Abstract:-

Introduction: *Infection is a major cause of morbidity and mortality in burn patients, in spite of considerable advances in burn wound care and medical treatment. In patients with Grade 3 burns, 75% of all death is currently related to sepsis from burn wound infections. Infection causes 50% to 60% of deaths in burn patients in spite of intensive therapy with antibiotics both topically as well as intravenous.*

Aim Of The Study: *The present study was undertaken to know the aerobic bacteriological profile of burn wound infection and their antimicrobial susceptibility pattern.*

Materials And Methods: *A total of 50 specimens were received from burn patients between April and August 2013. Swabs were taken from infected burns with aseptic precautions and transported to laboratory. All the samples were processed as per CLSI guidelines. Antimicrobial susceptibility testing was done by Kirby-Bauer Disk Diffusion method according to CLSI guidelines.*

Results: *A total of 48 bacterial pathogens were isolated from 50 samples. The most frequent cause of infection was found to be Pseudomonas aeruginosa (50%), followed by Staphylococcus aureus (20%), Klebsiella spp (14%), Escherishia coli (8. %), A High level of drug resistance was observed for Cefotaxime,and Ceftazidime among gram negative pathogens. Piperacillin/Tazobactam, Amikacin and Ciprofloxacin were found to be most effective. Forty percent of the S. aureus isolates were methicillin resistant but none was resistant to Vancomycin & Linezolid.*

Discussion: *In our study, Pseudomonas aeruginosa was the commonest organism isolated, followed by the Staphylococcus aureus. A significantly high percentage of resistance among gram-negative bacilli to Ceftazidime and Cefotaxime is seen. This alarming trend was seen for both Enterobacteriaceae group and for Pseudomonas aeruginosa. Least resistance was seen to Amikacin, and Piperacillin/Tazobactam. Forty percent Staphylococcus aureus were found to be methicillin resistant. However Vancomycin and Linezolid were shown to be 100% effective.*

Conclusions: *The present study shows pseudomonas aeruginosa to be the most common isolate. The pathogens are multidrug resistant with only few available options like amikacin, piperacillin/tazobactem, linezolid and others. This suggests that hygiene should strictly be maintained around burn patients to avoid opportunistic infections.*

INTRODUCTION

Skin is one of the largest organs in the human body in terms of size and weight. The average adult skin surface area is 1.5 to 2.0 square meters. An intact human skin surface is vital to the preservation body fluid homeostasis thermoregulation and the host's protection against infection. The skin also has immunological, neurosensory, and metabolic functions such as vitamin D metabolism. Burn injury creates a breach in the surface of the skin and hampers those vital functions which are essential to sustain life.[1] In India 700,000 burn patients are admitted to hospitals each year[2].

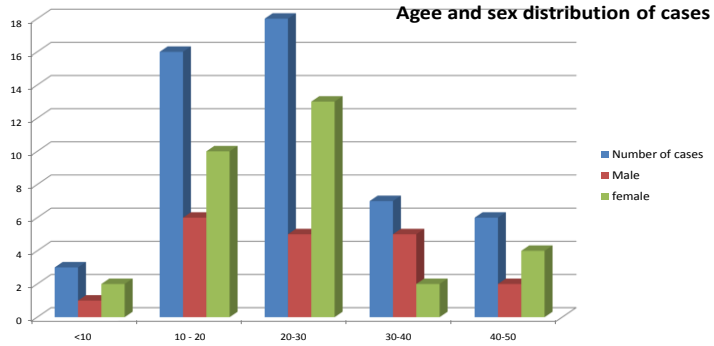
Burn wounds are highly susceptible to colonization & infection by microorganisms and this is a major problem in the management of burn victims[3]. The rate of nosocomial infections are higher in burns patients due to various factors like nature of burn injuries itself, immunocompromised status of patients, invasive diagnostic and therapeutic procedures and prolonged ICU stay.[4] It has been estimated that about 75% of the mortality associated with burn injuries is related to sepsis especially in developing countries[5] The bacterial flora undergoes a change over a period of time and is dependent upon length of hospitalization, environmental contamination, endogenous bacterial flora of patients and dressing procedures[6]. This necessitates periodic review of the isolation pattern and study of antibiogram of the isolates to strengthen surveillance activities. The present study was undertaken to know the antimicrobial susceptibility profile of various bacterial isolates recovered from patients of infected burn wounds which will help in instituting empirical therapy and minimize irrational use of antimicrobial agents.

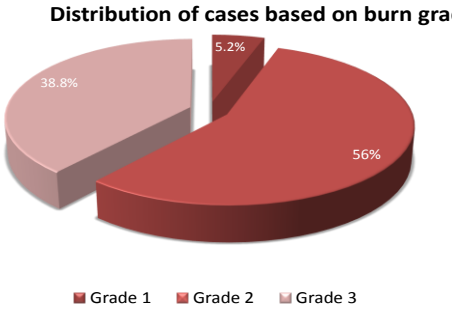
MATERIAL AND METHOD

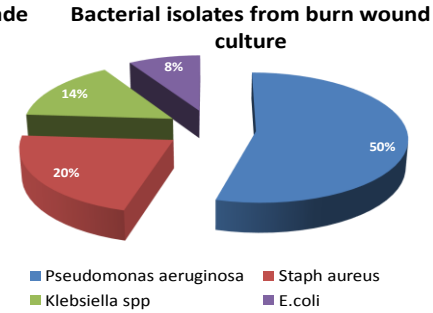
After taking ethical clearance from the Institutional Ethics Committee, study was conducted in the Department of Microbiology at Vijayanagar institute of Medical sciences, Bellary. A total of 50 specimens were received from burn patients between April and August 2013. Wound swabs were taken with aseptic precautions using disposable sterile swabs. All samples were collected and processed after obtaining informed consent from patients. Samples collected were immediately transferred to the central laboratory where they were processed. These samples were cultured on chocolate agar and MacConkey agar and incubated aerobically overnight at 37^0C. The Isolates were identified based on standard microbiological methods including culture, staining and biochemical tests. The antimicrobial susceptibility testing of the isolates was carried out by Kirby Bauer disc diffusion method using commercially available antimicrobial discs procured from the Hi Media Laboratories Pvt. Ltd., Mumbai. Sensitivity results were interpreted according to CLSI guidelines.

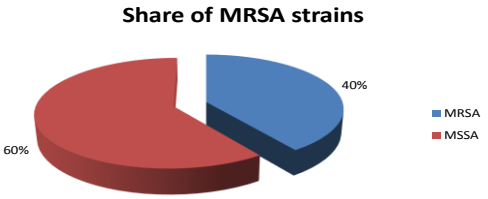
RESULTS

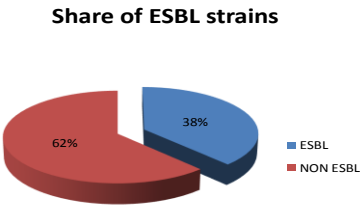
A total of 48 bacterial pathogens were isolated from 50 samples. The most frequent cause of infection was found to be *Pseudomonas aeruginosa* (50%), followed by *Staphylococcus aureus* (20%), *Klebsiella* spp (14%), *Escherishia coli* (8. %), A High level of drug resistance was observed for Cefotaxime,and Ceftazidime among gram negative pathogens. Piperacillin/ Tazobactam, Amikacin and Ciprofloxacin were found to be most effective. 40 % of the *S. aureus* isolates were methicillin resistant but none were resistant to Vancomycin or Linezolid.











DISCUSSION

In the present study, *Pseudomonas aeruginosa* was the commonest organism isolated, accounting for (50%) of the total isolates, followed by the *Staphylococcus aureus* (20%). Our observations were in accordance with Naveen saxsena et al,[3] M.Idomir et al.[7] and Iman.A et al[8] . We noted a significantly high percentage of resistance among

gram-negative bacilli to Ceftazidime, Cefotaxime. This alarming trend was seen for both Enterobacteriaceae group and for *Pseudomonas aeruginosa*. Least resistance was seen to Amikacin, and Piperacillin/Tazobactam. Forty percent *Staphylococcus aureus* were found to be methicillin resistant. However Vancomycin and Linezolid were shown to be 100% effective.

This high antimicrobial resistance is probably promoted due to selective pressure exerted on bacteria due to numerous reasons like non adherence to hospital antibiotic policy and excessive and indiscriminate use of broad-spectrum antibiotics. These multi drug resistant strains establish themselves in the hospital environment in areas like sinks, taps, railing, mattress, toilets and thereby spread from one patient to another

CONCLUSIONS

The present study shows *pseudomonas aeruginosa* to be the most common isolate. The pathogens are multidrug resistant with only few available options like amikacin , piperacillin/tazobactem , linezolid and others. This suggests that hygiene should strictly be maintained around burn patients to avoid opportunistic infections. This study concludes that in vitro testing prior to antibiotic use may help in the prevention and treatment of multi-drug resistant pathogens in burn infection. Isolation pattern and antibiogram of burn wound of this study provides adequate and effective treatment that will reduce Morbidity and mortality of patients.

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