AEROBIC BACTERIAL ISOLATES FROM BURN WOUND INFECTION PATIENTS AND THEIR ANTIMICROBIAL SUSCEPTIBILITY PATTERN IN KOTA, RAJASTHAN.

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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. Burn wound infections are largely nosocomial in origin, incidence and isolation differ from hospital to hospital, study of isolates and their antibiogram is necessary to provide adequate and effective treatment that will reduce morbidity and mortality of patients. **OBJECTIVE:** The present study was undertaken to know the aerobic bacteriological profile of burn wound infection and their antimicrobial susceptibility pattern. **MATERIAL AND METHOD:** A total of 209 specimens were received from burn patients between January to July 2012. Wound swabs were taken with aseptic precautions by disposable sterile swabs. These swabs were transported to central laboratory where they were cultured on blood agar and MacConkey agar and incubated aerobically overnight at 37^0C. Isolates were identified based on standard microbiological methods and antimicrobial susceptibility testing was done by Kirby Bauer's disc diffusion method. **RESULT:** A total of 147 bacterial pathogens were isolated from 209 samples. The most frequent cause of infection was found to be Pseudomonas aeruginosa (48.3%), followed by Staphylococcus aureus (19.29%), Escherichia coli (13.26%), Klebsiella spp. (8.44%), Proteus spp. (3.7%), Enterococcus spp.(6 %) & Citrobacter spp. (1%). High level of drug resistance was observed for Cefotaxime, Ceftazidime and Cotrimoxazole among gram negative pathogens. Imipenem, Piperacillin/Tazobactam, Amikacin and Ciprofloxacin were found to be most effective. Twenty two percent of the Staphylococcus aureus isolates were methicillin resistant but none was resistant to Vancomycin & Linezolid. **CONCLUSION:** Pseudomonas aeruginosa is a major cause of infection in burn wounds which showed high level resistance to antimicrobials. The high prevalence of antimicrobial resistance emphasizes the need for strengthening the infection control practices and regular and periodical surveillance activities to contain the upward trend of resistance. Isolation pattern and antibiogram

from burn patients of this study provides guidelines for adequate and effective antibiotic treatment that will reduce morbidity and mortality of patients.
KEY WORDS: Burn wound infection Antimicrobial susceptibility testing

INTRODUCTION: Burn wounds are highly susceptible to colonization & infection by microorganisms and this is a major problem in the management of burn victims.[1] Infected burn wounds are not only associated with a delay in epidermal maturation and deep scar formation but also prolongs the hospital stay of the patient and increases the chances of mortality due to sepsis, when compared to non-infected patients.[2] Most of the burn victims, who survive including the initial 24 hours after burns, succumb to burn infection and its complications. Immediately following the thermal injury, the burn wounds are sterile; but eventually get Colonized with microorganisms.[3] Staphylococci that are present deep within sweat glands and hair follicles colonize the wound surface within the first 48 hours. After 5-7 days, the GNB and yeast derived from the host's normal GI flora, upper respiratory tract and the hospital environment get transferred to the wounds through: vectors, such as health care workers.[4] Various factors responsible are disruption of the skin barrier, a large cutaneous bacterial load, the possibility of the normal bacterial flora becoming opportunistic pathogens and severe depression of the immune system. All these factors contribute towards the sepsis in a burn victim.[5] Despite various advances in infection control measures, like early detection of microorganisms and newer and broad spectrum antibiotics, management of burn septicemia still remains a big challenge and septicemia continues to be the leading cause of death in burn patients.[6] It is now estimated that about 75% of the mortality following burn injuries is related to infections rather than osmotic shock and hypovolemia.[7] The pattern of infection differs from hospital to hospital; the bacterial flora of infected wound may change considerably during the healing period.[8] Emergence of multi drug resistant pathogens in hospital setting has seriously constrained the available therapeutic options. 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: Institutional Ethics Committee, this study was conducted in the Department of Microbiology at the central Laboratory of Government Medical College, Kota (Rajasthan). A total of 209 specimens were received from burn patients between January to July 2012. The patients with 50% burn were enrolled in this study. Wound swabs were taken with aseptic precautions using disposable sterile swabs. All samples were collected and processed after obtaining informed consent from patients and the samples were immediately transferred to the central laboratory where they were processed.

These samples were cultured on blood 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.[9] The antimicrobial susceptibility testing of the isolates was carried out by Kirby Bauer disc diffusion method[10] using commercially available antimicrobial discs procured from the HiMedia Laboratories Pvt. Ltd., Mumbai. Sensitivity result was interpreted according to National Committee of Clinical Laboratory Standard (NCCLS).[11]

RESULT: A total of 147 bacterial pathogens were isolated from 209 samples. The most frequent cause of infection was found to be Pseudomonas aeruginosa (48.3%), followed by Staphylococcus aureus (19.29%), Escherichia coli (13.26%), Klebsiella spp. (8.44%), Proteus spp. (3.7%), Enterococcus spp. (6%) & Citrobacter spp.(1%).(Table 1) A High level of drug resistance was observed for Cefotaxime, Ceftazidime and Cotrimoxazole among gram negative pathogens. Piperacillin/Tazobactam, Amikacin and Ciprofloxacin were found to be most effective.(Table 2) Twenty two percent of the S. aureus isolates were methicillin resistant but none was resistant to Vancomycin & Linezolid.(Table 3)

DISCUSSION: In our study, Pseudomonas aeruginosa was the commonest organism isolated, accounting for 48.3% of the total isolates, followed by the Staphylococcus aureus (19.29%). Our observations were in accordance with Yildirim et al,[12] Zorgani et al[13] and Wonkeun Songa et al.[14] We noted a significantly high percentage of resistance among gram-negative bacilli to Ceftazidime, Cefotaxime and Cotrimoxazole. This alarming trend was seen for both Enterobacteriaceae group and for Pseudomonas aeruginosa. Resistance among the Gram-negative bacilli was, in general, least to Imipenem, Amikacin, Ciprofloxacin and Piperacillin/Tazobactam. Twenty two percent Staphylococcus aureus were found to be methicillin resistant. However Vancomycin and Linezolid were shown to be 100% effective. Staphylococcus aureus was highly resistant to Erythromycin & Co-trimoxazole. This was in accordance with Kehinde AO et al.[15]

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.

CONCLUSION: Pseudomonas aeruginosa is a major cause of infection in burn wounds which showed high level resistance to antimicrobials. Amikacin, Imipenem, Ciprofloxacin and combination drugs like Piperacillin/Tazobactam were found to be effective for Gram negative organisms hence could be used for empirical therapy. Vancomycin & Linezolid (100%) were found to be most effective drugs for Gram positive organisms. The high prevalence of antimicrobial resistance emphasizes the need for strengthening the infection control practices and regular and & periodical surveillance activities to contain the upward trend of resistance.

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.

TABLE 1: The distribution of bacterial isolates from infected burn wounds

Organisms	Total no. n=147
Pseudomonas aeruginosa	71 [48.3%]
Staphylococcus aureus	28 [19.29%]
Escherichia coli	19 [13.26%]
Klebsiella spp.	12 [8.44%]
Proteus spp.	06 [3.7%]
Enterococcus spp.	10 [6%]
Citrobacter spp.	01 [1%]

TABLE 2: Antimicrobial susceptibility pattern of Gram negative isolates

Antimicrobial agent	Pseudomonas aeruginosa (71)	Escherichia coli (19)	Klebsiella spp. (12)	Proteus spp. (06)	Citrobacter spp. (01)
Piperacillin/ Tazobactam	62	15	09	04	01
Ceftazidime	49	13	09	03	01
Cefotaxime	NT	10	07	02	01
Imipenem	68	19	10	05	01
Amikacin	64	18	10	05	01
Ciprofloxacin	60	16	09	05	01
TMP+SMX	NT	11	08	03	01

NT = Not tested

TMP+SMX = Trimethoprim, Sulphamethoxazole

TABLE 3: Antimicrobial susceptibility pattern of Gram positive isolates

Antimicrobial agent	Staphylococcus aureus (28)	Enterococcus spp (10)
Erythromycin	18	R
Cotrimoxazole	19	R
Ceftriaxone	23	R
Ciprofloxacin	26	R
Amikacin	26	R
Clindamycin	24	R
Cefoxitin	22	R
Vancomycin	28	10
Linezolid	28	10

R = Resistant

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