



ANTIMICROBIAL SUSCEPTIBILITY, BACTERIOLOGICAL PROFILE AND PATTERN OF BURN WOUND ISOLATES OF BURN PATIENTS

Microbiology

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ABSTRACT

BACKGROUND: Infection is a communal cause of morbidity and mortality in burn patients. Clinical diagnosis of sepsis in burn patients is problematic for several reasons.

OBJECTIVE: To find out the bacterial profile for post burn infection in pus and blood. And to evaluate the antibiotic sensitivity of organisms cultured and isolated.

METHODS: A retrospective study was conducted at Multi-speciality Hospitals Burn's Unit at Gwalior, Madhya Pradesh. Fifty burn patients were investigated for bacterial profile of burn wound infections. Specimens were collected on 3rd and 7th day of burns in the form of wound swabs. Antimicrobial susceptibility test was done by Kirby - Bauer disc diffusion method. Epi-info (version 7.0) was used for analysis.

RESULTS: Gram negative organisms were found to be more prevalent. The most common isolate was *Pseudomonas aeruginosa* (*P. aeruginosa*) - 38%, followed by *Staphylococcus aureus* (*S. aureus*) -26%, *Klebsiella* spp.-4%, and *Escherichia coli* -11%.

CONCLUSIONS: *Pseudomonas* was the commonest cause of infection in burn patients followed by *S. aureus*. About 80% of the isolates showed multiple resistances. Regular antibiotic resistance test must be done for each patient in order to select a suitable antimicrobial agent.

KEYWORDS

Burn, Antibiotic susceptibility, Bacteriological profile, Sepsis.

INTRODUCTION-

Burn patients are perfect hosts for opportunistic infections.¹The burn site remains relatively sterile during the first 24 hour; thereafter, colonization of the wound by gram negative bacteria is public.²*Pseudomonas aeruginosa* has emerged as a predominant member of the burn wound flora and in the absence of topical therapy is cultured from the burn injuries of 70% patients by the third week.³Microorganisms routinely isolated from burn wounds include aerobic organisms like *Staphylococcus*, *Streptococcus pyogenes*, *E.coli*, *Klebsiella* spp., *Proteus* etc., anaerobic organisms like *Bacteroides fragilis*, *Peptostreptococcus*, *Propionibacterium* spp. and fungi like *Aspergillus niger*, *Candida* spp.⁴The surface of every burn wound is contaminated to some degree by bacteria.⁵Because of this, surface bacterial growth is routinely monitored in most centers to facilitate management and treatment. Recent reports suggest that the incidence of *Pseudomonas* infections is decreasing, whereas multiple antimicrobial resistance has emerged in several gram-negative organisms that were not therefore considered major pathogens.⁶ So, the rationale behind the study was to study the micro flora in burn wounds and blood of the burn patients from Multi- speciality hospitals.

MATERIALS AND METHODS-

Study Area- Department of Microbiology and Burn's Unit of Multi-speciality Hospitals, Gwalior.

Study type- Retrospective Record Based study

Study population- Patients who were admitted in Burn's unit

Study duration- April 2018 to March 2019

Sampling Technique- Consecutive sampling of the Agar plates

Sample Size- Wound swabs were collected on 3rd and 7th day. A total of 100 wound swabs were collected aseptically of 50 burn patients. Inclusion Criteria- patients who were >12 years and either gender was included.

Exclusion Criteria- Adult patients with partial thickness burns less than 10% body surface area. Patients with perineal burns and those with chronic diseases like tuberculosis, diabetes mellitus were excluded from the study.

METHODOLOGY-

Samples were cultured on nutrient agar, Mac-Conkey agar and Blood agar at 37°C for 24 hours. The isolates were identified by culture, staining and biochemical tests including oxidase, lactose and maltose fermentation, catalase and their antibiotic sensitivity determined using Kirby-Bauer disc diffusion technique.

Consent Type- Written Informed consent

Ethical Consideration- Permission before using the record was taken from the administration of hospitals.

Statistical analysis-

Data will be consolidated and entered a Microsoft Excel spreadsheet and then transferred to Epi info version (7.1.3.0. centre for disease control and prevention, Atlanta, Georgia, USA, 2013) software for analysis.

RESULTS-

Table 1- Age and Gender distribution of Burn cases

Sex	Number of Cases (%)
Male	24 (48)
Female	26 (52)
Age groups	
11-30 years	24 (48)
31-50 years	20 (40)
>51 years	6 (12)

As per table 1 Fifty two percent of the burn cases belonged to Female, while 48% were males. The most common age group was 11- 30 years comprising 48% of cases followed by 31-50 years in 40%. This clearly shows that burn patients were young and mostly females.

Table 2- Bacterial Isolates on 3rd and 7th day of Burns

Bacterial isolates	Wound swab specimen		Cases (%)
	3 rd day	7 th Day	
<i>P.aeruginosa</i>	20	18	38 (38)
<i>S.aureus</i>	14	12	26 (26)
<i>Proteus</i> spp.	8	6	14 (14)
<i>e.coli</i>	6	5	11 (11)
<i>Klebsiella</i> spp.	3	1	4 (4)
<i>Acinetobacter</i> spp.	2	1	3 (3)

Table 2 shows in the present study *Pseudomonas aeruginosa* (38%) was the commonest isolate from burn wounds followed by *Staphylococcus aureus* (26%), *Proteus* spp. (14%), *E.coli* (11%), *Klebsiella* spp. (4%) and It is evident that *P. aeruginosa* has emerged as a great threat in burn wound infection and it's very important that antibiotic policy is formulated to keep a check on it.

Table 3- Antibiotic Sensitivity pattern in Bacterial Isolates

Antibiotic tested	PA (38)		SA (26)	
	S	R	S	R
Amikacin	6.25	0	13.6	15.3
Ampicillin	81.2	66.6	77.2	84.6
Aztreonam	62.5	66.6	72.7	92.3

Cefazolin	62.5	66.6	77.7	92.3
Cefotaxime	62.5	66.6	72.7	92.3
Ceftazidime	62.5	66.6	72.7	92.3
Cefepime	56.2	66.6	72.7	92.3
Cefoxitin	25	50	38	50
Cotrimoxazole	50	66.6	45	77.7
Colistin	6.2	16.6	0	0
Gentamicin	15.3	0	15.7	10
Imipenem	12.5	16.6	28.5	38.4
Meropenem	50	50	66.6	84.6
Nitrofurantoin	18.7	0	14.2	38.4
Norfloxacin	56.2	66.6	73.6	75
Piperacillin	75	66.6	80.9	69.2
Piperacillin/	6.2	0	20	25
Tetracycline	68.7	83.3	60	76.9
Ticarcillin	75	60	73.6	76.9

About the antimicrobial susceptibility/sensitivity pattern, all the isolates were tested against the following commonly prescribed drugs at the center and widely used in the country. *P. aeruginosa* was most sensitive to Ampicillin (81.2%), whereas most of the gram-negative isolates obtained were found to be multidrug resistant. Resistance of *S. aureus* was 92% observed with and Piperacillin-tazobactam and 69% to Ceftriaxone. Since most of the isolates were *P. aeruginosa* and *Staph. aureus* only these two were studied in Table 4

DISCUSSION-

Incidence of burn was higher in females because females mostly spend their time in kitchen where accidents happen. Highest incidence in our study was flame burn. This may be due to socioeconomic reasons in our society. The age group mostly affected by burn injury was between 11 and 30 years. This was consistent with the study conducted by Sapna G in which the most common age was 20-30 years. In our study *Pseudomonas aeruginosa* was main culprit.^{8,9} *S. aureus* was found to be the most common isolate on day 3 while *P. aeruginosa* on day 7. Prevalence of *Pseudomonas* spp. in the burn wards may be due to the fact that organism thrives in a moist environment.¹⁰ The present study has shown that *P. aeruginosa* and *S. aureus* are the most common isolates in burn injuries, *Klebsiella* spp. was the third most common isolate, followed by *Acinetobacter* spp., *S. epidermidis* and *Proteus*. Ahmad et al in their study have demonstrated that infections by gram positive organisms were more common in first 5 days of burns while gram negative organisms dominate the infection scene thereafter.¹¹ A study conducted by Sharma S. and Hans C. in RML Hospital, Delhi concluded that *Pseudomonas* is the most common organism isolated in the burn wounds which is consistent with our finding.⁸ Antibiotic sensitivity patterns revealed that many of the isolates were resistant to commonly used antibiotics like cephalosporin group, quinolones etc. which are being indiscriminately used on empirical basis for prolonged duration of time. Resistance to various antibiotics routinely used has been reported from several studies. *S. aureus* seen to be sensitive to Amikacin and Piperacillin-tazobactam.⁹ MRSA prevalence in our hospital was high (40%). In a study by Buzaid N et al, MRSA prevalence was found to be 31%.¹² Amikacin a second-generation aminoglycoside was effective against *Pseudomonas*, *E. coli* and *Klebsiella* in our study.^{9,13}

CONCLUSION-

Pseudomonas aeruginosa the main culprit in burn wound infections. This proposes that in burn patients overcrowding and hygiene problem are main causes of these infections. The infection of burn wounds with multiple organisms, with superadded problem of drug resistance, indicate the institution of a drug policy by the hospitals for burns patients.

Conflict of Interest- None declared

Source of Funding- None

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