

# A Bacteriological Study of Infections in Burns Cases



## Medical Science

**KEYWORDS :** Burns, Infection, Antibiotic sensitivity

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### ABSTRACT

*Infections with micro-organisms are very common in burn wound. Total 100 samples were studied for bacteriology and antibiotic sensitivity pattern. 79% of samples showed positive growth. Total 120 organisms were isolated. 51% samples showed single type of organisms and 49% of samples showed multiple types of organisms. Most common isolated organisms were Pseudomonas aeruginosa, Klebsiella spp., Staphylococcus aureus. Gram positive organisms were more common in early days of post-burn while gram negative bacteria were more common after 7 days of post-burn. All organisms showed maximum sensitivity to Ciprofloxacin(35%). Gram negative bacteria showed sensitivity to Amikacin(44%), Ciprofloxacin(24%). Gram positive bacteria were sensitive to Ampicillin/Sulbactam (76%), Ciprofloxacin(66%) and Lincomycin(60%). Most organisms were resistant to Gentamycin(99%) and Co-trimoxazole(95%). Organisms in mixed infection showed high degree of resistance to antibiotics as compared to single strains. From this study it is concluded that the empirical treatment with Amikacin or Ciprofloxacin should be started immediately.*

### Introduction:

Burns is the thermal coagulative necrosis of tissue as a result of injury caused by dry heat & moist heat.<sup>(2)</sup> Infection is the most common & most difficult complication that accounts for 50-70% of deaths & severely burned patients are very susceptible to infection.<sup>(7,8,10,19)</sup> Burn wound sepsis is the active proliferation of bacteria in numbers exceeding 10<sup>5</sup> organisms per gram of tissue and associated with active invasion of the subjacent unburned tissue.<sup>(13,18)</sup>

### Materials and method:

This study was conducted on 100 samples from patients admitted to burns ward and specimens collected are pus or swab from the burn wound by aseptic method. Along with samples detailed history of patients were collected.

In microbiology laboratory, all these samples were processed as per standard methods of gram staining and isolation<sup>(4,5,12)</sup> and isolated organisms are confirmed by various biochemical tests<sup>(4,12,14)</sup>

All these isolates were subjected to antibiotic sensitivity test by using disk diffusion technique of Bauer et al (1966) method<sup>(4,12,14)</sup>

### Results:

Out of 100 samples 79 samples showed growth and rest are negative showing high infection rate. Maximum no. of cases are 41 in age group 30-39 years followed by age group 20-29, 21 cases.

Females (58%) were more affected than males (42%) and thermal type of burn was most common (64 %).

**Table 1: Distribution of patients according to body surface area (TBSA)**

Total body surface area in %	Male	Female	Total
1-10 %	01	01	02
11-20 %	07	04	11
21-40 %	13	20	33
41-60 %	12	18	30
>60 %	00	03	03
Total	33	46	79

Table-1 shows that the highest numbers of infected patients were found in TBSA 21-40% followed by 41-60% group.

In this study, single type of organisms was isolated in 40 cases and from 37 cases two types of organisms were isolated. Gram negative organisms were isolated in 47 patients while gram positive organisms were isolated in 15 patients while mixed variety were isolated in 17 patients. Gram positive organisms were isolated more within first 7 days of admission while gram negative organisms were isolated more after 7 days of admission.

Table-2 shows organisms isolated. Most common isolated organism was Pseudomonas(30%), followed by Klebsiella (20%), Staphylococcus aureus (16%), Proteus mirabilis (10%), E.coli, CONS, Streptococci, Cl.tetani, Proteus vulgaris, Enterobacter, Cl.welchii and Providencia were isolated in <5% of cases.

**Table-2: Organisms isolated in order of frequency**

Organisms	No. of Isolates	% of Total Strains
Pseudomonas spp.	35	30%
Klebsiella spp.	25	20%
Staph. aureus	19	16%
Proteus mirabilis	12	10%
E.coli	09	7.5%
CONS	07	5.8%
Streptococci	04	3.3%
Cl. tetani	03	2.5%
Proteus vulgaris	02	1.6%
Enterobacter	02	1.6%
Cl. welchii	01	0.8%
Providencia rettgeri	01	0.8%

In gram positive organisms, most common organism was Staphylococcus aureus (19 isolates) and most effective antibiotics were Amoxiclav (68%) & Ciprofloxacin (68%), however it was resistant to Co-trimoxazole, Ofloxacin, Cloxacillin & Gentamicin.

In gram negative organisms, most common organism was *Pseudomonas aeruginosa* (35 isolates) and Amikacin (31%) was the most sensitive drug followed by Ciprofloxacin (14%). However, it was resistant to Gentamycin, Cefuroxime, Kanamycin and Nalidixic acid.

Out of 25 isolates of *Klebsiella* spp. Amikacin (64%) was the most sensitive drug followed by Ciprofloxacin (32%). However, it was resistant to Cephalexin, Cefuroxime, Kanamycin, Ampicillin, Chloramphenicol and Nalidixic acid.

It was also observed that single isolated strains were more sensitive to antibiotics than mixed infection.

### Discussion

In this study, a total 100 samples were studied with 79 samples showed positive results with bacterial growth, with a total 120 bacterial strains.

In present study it was noted that multiple isolates were present in 39 (49%) cases & this result is comparable to the study by Revathi G. et al(1998) <sup>(16)</sup>

Most common isolated organism was *Pseudomonas aeruginosa* (29%) & it was the most common organism in other studies also. <sup>(3,9,13)</sup> The second most common isolate was *Klebsiella*(20%) which is comparable to various studies. <sup>(3,13)</sup> *Staphylococcus aureus* was isolated in 16% isolates that is comparable to study of Revathi G. <sup>(16)</sup>, however other studies showed a high percentage of *Staphylococcus aureus* isolates. The percentage of *E.coli*, *CONS*, *Streptococci* and *Proteus* spp were comparable to other studies.

Gram negative bacteria are 3 times more common than gram positive bacteria due to a variety of exogenous and endogenous sources and also due to hospital environment. <sup>(5,6,7,8)</sup>

Gram positive bacteria are more common in early days of post

burn. After 7 days, gram negative bacteria become dominant and replace gram positive bacteria. This is similar to earlier studies. <sup>(17)</sup>

High degree of resistance in bacterial strains in mixed infection to that of single isolated bacteria is due to transfer of resistance. <sup>(5,11,15)</sup>

Overcrowding and prolonged hospital stays serves major factors for hospital acquired infection. Irrational use of antibiotics leads to increase resistance to antibiotics.

The high incidence of *Pseudomonas* infection is from sources outside the patient as these organisms thrive in moist environment. <sup>(18)</sup> High incidence of *Proteus* spp. and *Klebsiella* spp. may be due to frequent cross infection with these organisms or it may be due to selective result of poorer growth conditions for *E.coli* as it grows optimally in colon. <sup>(14)</sup>

The antibiotic sensitivity patterns of strains isolated from burns also suggest the view that a large proportion of these organisms are hospital acquired and many burns become colonized by several species of gram negative bacilli which would provide opportunities for resistance to be transferred and to increase even when antibiotics are not used. <sup>(6,11,15)</sup>

### Conclusion:

High numbers of patients are infected with resistant micro-organisms in burn wound due to loss of primary defense as well as cross infection. Gram negative infection is due to endogenous route while gram positive infection is from surface contamination. Multiple invasions of organisms are very common and that also provides opportunities for transfer of resistance among organisms. From this study it is concluded that systemic administration of Amikacin or Ciprofloxacin should be started immediately along with strict aseptic measures, local antimicrobial therapy and skin grafting to reduce morbidity and mortality in burns patients.

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