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Research Article

Pattern of bacteria and their antimicrobial susceptibility among patients with burns at a Tertiary care Hospital

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Abstract: Infections are the major cause of morbidity and mortality in burn patients. Three fourth of deaths in burn patients occur due to infections. The objective behind this work was to find out the bacteriological profile of burn infections and antimicrobial susceptibility pattern of the organisms isolated. All the burn patients admitted during the study period were considered as the study subjects hence totally 89 patients recruited for the study. Culture and sensitivity report of respective patients were collected from the microbiology department. The most common organism isolated was Staph.aureus (34.8%) followed by pseudomonas (27%), citrobacter (25.9%), E .coli (22.2%), Klebsiella (15.8%), proteus mirabilis (3.4%) and streptococcus (01.1%). The study emphasizes the need to introduce strict aseptic measures in burnsward and to formulate an antibiotic policy in the hospital.
Keywords: Antibiotic sensitivity, burn, swab culture

INTRODUCTION

Burn wound infection is one of the most common causes of mortality and morbidity in burn patients [1]. Major burn can be defined as any burn that requires intravenous resuscitation fluid or covers 10% of body surface area in children and 15% of the body surface area in adults; and/or also burn that involves the air way [2,3,4].

Infection in burn patient is a leading cause of morbidity and mortality and it continues to be the challenging concern; the importance of preventing infection has been recognized in organized burn care centers starting from its inception. These included strict asceptic techniques, use of sterile gloves and dressing materials, wearing masks for dressing changes and special separation of patients, using private rooms [5].

Burn patients are ideal hosts for opportunistic infections [6]. The burn site remains relatively sterile during the first 24 hour; thereafter , colonization of the wound by gram negative bacteria is common [7]. 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 [8]. Microorganisms routinely isolated from burn wounds include aerobic organisms like *Staphylococcus aureus*, *Streptococcus pyogenes*, *E.coli*, *Klebsiella Spp.*, *Proteusetc*., anaerobic organisms like Bacteroidesfragilis,Peptostreptococcus, Propionibacterium Spp., FusobacteriumSpp and fungi like Aspergillusniger, Candida Spp and Zygomycetes [9].

Use of antimicrobials has altered the flora that is found to colonize the wounds of patients with burns and trauma related injuries. *Staphylococcus aureus* remains a common colonizer and has developed resistance to several anti-microbial agents. Recent reports suggest that the incidence of Pseudomonas infections is decreasing, whereas multiple antimicrobial resistances has emerged in a number of gram negative organisms that were not therefore considered major pathogens [10]. Progress in this regard can be attributed towards improvements in anti-microbial therapy, wound management& nutrition [11].

The present study is undertaken to study the micro flora in burn wounds of the burn patients from a tertiary care medical hospital.

METHODOLOGY

A case series study was carried out at a tertiary care hospital, Ballari, Karnataka. All the burn patients admitted during the study period were considered as the study subjects hence totally 89 patients recruited for the study. Culture and sensitivity report of respective patients were collected from the microbiology department. A written informed consent was taken from the patients and the individual confidentiality of the

data was maintained. A semis structured proforma was prepared to gather the relevant information like percentage of burns, age, gender, microbial flora and antibiotic sensitivity. Data was entered in Microsoft excel and was analyzed using SPSS 21 and results were presented as Proportions.

RESULTS

Table-1: Age wise distribution

Age group	Frequency	Percentage
≤20 years	15	16.5%
21 – 30 years	29	31.9%
31 – 40 years	22	24.2%
41 – 50 years	14	15.4%
51 – 60 years	08	08.8%
>60 years	01	01.1%
Total	89	100%

Among total study subjects,31.9% of them were in the age group of 21 – 30 years, followed by 24.2% in 31 – 40 years, 16.5%</= 20 years, 8.8% in 51 – 60 years and 1.1% more than 60 years.

Table-2: Gender wise distribution

Gender	Frequency	Percentage
Male	55	61.8%
Female	34	38.2%
Total	89	100%

Patients comprised of males and females, male constituted 61.8% and female 38.2%

Table-3: Percentage of burns

% of Burns	Frequency	Percentage
15-20	1	1.1%
20-30	15	16.9%
30-40	24	27.0%
35-40	2	2.2%
40-45	2	2.2%
40-50	20	22.5%
45-50	2	2.2%
50-60	19	21.3%
55-60	1	1.1%
60-70	3	3.4%
Total	89	100%

Distribution of patients based on percentage of burns revealed that highest proportion of patients had 30 – 40 percent burns (27%) followed by 40 – 50 percent burns (22.5%), 50 – 60 percent burns (21.3%) and 20 -30 percent burns (16.9%).

Table-4: Types of isolates

Isolates	Frequency	Percentage
Pseudomonas	24	27.0%
E.coli	18	22.2%
Klebsiella	14	15.8%
Staph.aureus	31	34.8%
Streptococcus	01	01.1%
Proteus mirabilis	03	03.4%
Citrobacter	23	25.9%

The most common organism isolated was Staph.aureus (34.8%) followed by pseudomonas (27%), citrobacter (25.9%), E .coli (22.2%), Klebsiella (15.8%), proteus mirabilis (3.4%) and streptococcus (01.1%).

Table-5: Antibiotic sensitivity

Antibiotics	Frequency	Percentage
Amikacin	19	21.3%
Ceftriaxone	12	13.5%
Ceftazideme	02	02.2%
Doxycycline	35	39.1%
Ciprofloxacin	08	08.8%
Clindamycin	05	05.5%
Cefoxitin	02	02.2%
Vancomycin	04	04.4%
Tobramycin	04	04.4%
Co trimaxazole	01	01.1%
Erythromycin	02	02.2%
Gentamycin	06	06.6%
Imipenem	12	13.1%
Azotreonam	04	04.1%
Moxifloxacin	05	05.5%
Linezolid	08	08.8%
Piperacillin+tazobatum	06	06.6%
Tetracycline	04	04.4%
Resistant to all	09	09.9%

The above table depicts that resistance to all was found among 9.9% of patients. The highest proportion of organisms was sensitive to Doxycycline(39.1%) followed by Amikacin (21.3%).

DISCUSSIONS

This study was conducted to determine the bacteriological profile and magnitude of bacteremia and has demonstrated 42% bacteremia. Bacterial isolates identified were Pseudomonas (27%), E.coli (22.2%), Klebsiella (15.8%), Staph.aureus (34.8%), citrobacter (25.9%), proteus mirabilis (03.4%) and streptococcus (01.1%); these isolates were similar to bacterial isolates identified at other different burn centers [12-14].

The bacterial isolates in this study are more or less similar to the bacterial profile identified at Ain Shams University Hospital, Cairo (9). Other studies (23,

25) have also indicated that anaerobic infections are rare. Rate of MRSA (34.8%) is low as compared to a study [15] from India has shown that the dominant cause of wound infection is MRSA (71%).

Open and large areas of burn injuries create favorable conditions for the penetration of hospital infection. For this reason, special attention to hospital infection should be paid in department of burns. According to the data provided in literature, the most common infection in burn patients is that with *Staphylococcus aureus* (34.8.0%) which is similar to our observation [16].

Staphylococcus aureus (MRSA) infection increases asthe patients spend more time in the department andundergo more frequent dressings. Therefore, interventionshould be performed as early as possible, thus decreasingthe duration of hospital stay, infection-related treatment

In the present study resistance to all drugs was found to be 9.9%.The higher incidence of resistant isolates could be because of the inappropriate use of antibiotics. Despite the fact that S. aureus and other common bacterial agents are similar at different burn centers; the antimicrobial sensitivity pattern cannot be compared between these centers because of difference in different prescription patterns and may be because there is no standardized prescription and management scheme common to all. However, the antibiotic treatment should be changed in accordance with the observed antibiotic susceptibility pattern in case of positive blood cultures and signs of sepsis. Because of the insufficient supply of drugs, the antimicrobial treatment choice and changes has to be made to the wise utilization of what is available at the time.

CONCLUSION

It is quite clear that infections are serious problem among burns patients. *Staphylococcus aureus* has emerged as the commonest organism causing infection and is resistant to most of the antibiotics. To keep a check on burn wound infections it is important for every hospital to have a data on prevalent organisms and their antibiotic susceptibility pattern.

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