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Original Article

Epidemiology of Burns Patients in a Tertiary Care Hospital in South India -A Retrospective Analysis

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Abstract

Burns are major health hazards which are associated with high mortality and morbidity rates. Burns management in developing countries is a major challenge due to inadequate access to burn care facility along with poorly equipped health care system. Although we are faced with a high burden of burns in our country, appropriate research on burns is still inadequate. We present our data of burns patients from a single center tertiary care hospital in south India.

Aim: To analyze various demographic characteristics, clinical and microbiological profile along with outcome of all burns patients admitted to our hospital.

Methods: This study was a retrospective analysis of burns patients admitted to the Critical Care Unit of Apollo Speciality Hospital, Vanagaram and a tertiary care facility in Chennai over a period of 3 years. Data such as age, gender, co-morbidities, type and degree of burns, percentage of burns and length of stay, mortality rate and infection rate were analyzed.

Results: There were a total of 94 burns patients included in the study. Amongst these, 61 patients (65%) were males and 33 patients (35%) were females. A majority of our burns population, 72% (n=68), belonged to age group from 21-50 years with a mean age of 40.50 years (SD±17.18).Mean total body surface area involved among burns was 48.56 (SD±21.08). Thermal burns were the commonest type of burns seen in 70%patients (n=66). These included flame burns in 49% patients (n=46) and scald burns in21% patients (n=20).Patients who presented to us within 6 hours post burns were 46% (n=43). Around 60% (n=56) patients had a hospital stay duration of ≤ 2 weeks. Infection rate among our patients was 62.8% and a mortality rate of 37% (n=35) was observed.

Conclusion: We highlight key demographic, clinical and microbiological data of all burns patients from a single center tertiary hospital in south India. This knowledge should help develop better strategies for management and prevention of mortality due to burns.

Introduction

According to a report by the World Health Organization, 95% of deaths due to burns are constituted by middle and low income countries. Burns management in developing countries is a major challenge due to inadequate access to burn care facility along with poorly-equipped health care system and thus is associated with high mortality and morbidity. Thermal burns have the propensity to result in a high mortality rate than other types of burns such as electrical burns and chemical burns [1]. Even though a person survives burns, the extent of social stigma and disability undergone post recovery is high. Therefore, International strategies have been deployed to strengthen means to prevent burn accidents. These strategies could be applied to developing countries like ours only if research were carried out on existing aspects and burden of burns. The change in demography and outcome of patients tell us the importance of enhancing burns care in critical care units.

In this study, we aim to highlight key demographic and clinical findings in our burns patients along with review of literature.

Methods

This is a retrospective study of all burns patients admitted to Apollo Speciality Hospitals, Vanagaram and a tertiary care facility in Chennai over a period of 3 years. All patients were managed in the Multi Disciplinary Critical Care Unit of our hospital after obtaining informed written consent. Demographic details such as age, sex, length of hospital stay were collected from clinical records. Relevant clinical findings such as percentage of burns calculated using Lund & Browder formula, degree of burns, outcome of patients based on the type of burns, mortality rate and infection rate were collected and data analyzed.

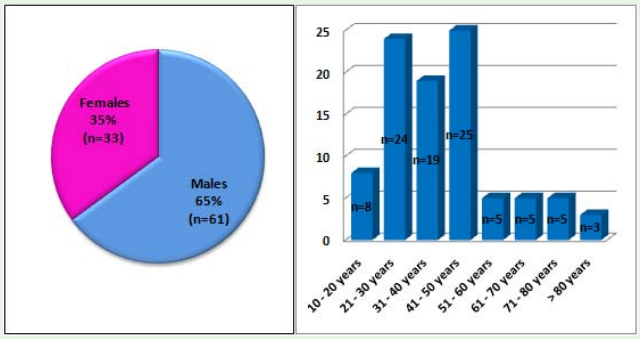

Figure 1: Gender and age wise distribution of patients with burns (n=94).

A profile of types and combinations of microorganisms isolated from these patients were collected and documented. Analysis also included various organisms and combination of organisms isolated from all burns patients. The above data were entered and analyzed from a Microsoft Excel spread sheet. Statistical analysis was performed using SPSS software. The principal variables analyzed were type of burns with mortality and total body surface area involved with mortality.

Results

Demographic details of patients with burns

Among a total number of 94 patients with burns, 65% were males and 35% were females (Figure 1). Mean age of burns patients was 40.50 years, ranging from the youngest being 15 years and oldest being 93 years (Figure 1).

Among 94 patients, 68 patients (72%) were aged between 21-50 years.

Majority (n=69) of our patients had no co-morbidities. Among others, diabetes mellitus was the commonest co-morbidity followed by hypertension and coronary artery disease. A small proportion of the patients (n=3) had psychiatric disorders.

Type of burns, extent and time of presentation and percentage of burns

Among 94 patients admitted with burns, 66 patients sustained thermal burns [49% flame burns (n=46), 21% scald burns (n=20)], followed by electrical burns in 26% (n=24) (Figure 2).

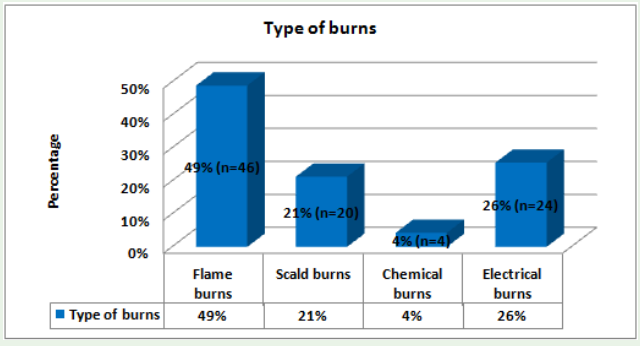

Figure 2: Distribution of patients based on type of burns.

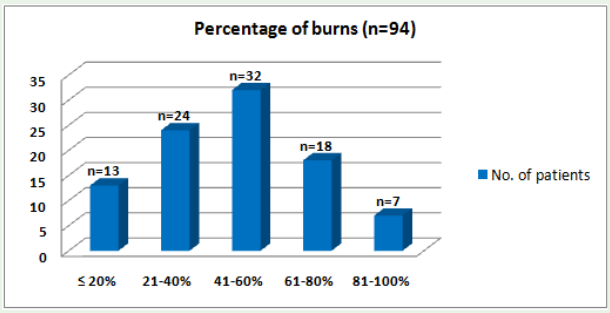

Figure 3: Distribution of patients based on percentage of burns(n=94).

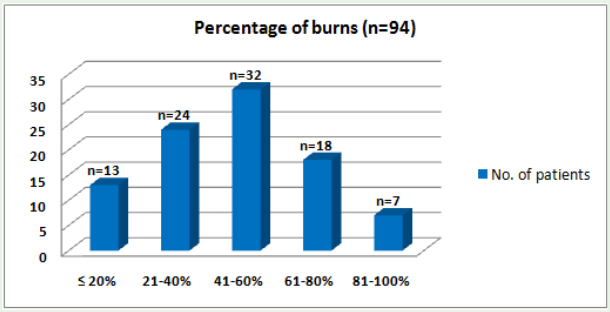

Figure 4: Distribution of patients based on time of presentation post burns (n=94).

Majority of 56 patients were admitted with 21-60% burns, followed by 25 patients with >60% burns. The remaining 13 patients had ≤ 20% burns (Figure 3).

There was a significant positive correlation between percentage of burns and mortality,

r (92) =0.578, p = 0.000 (Pearson`s correlation).

Majority of 55% (n=52) patients sustained third degree burns, 26% (n=24) sustained second degree burns. Fourth degree burns was sustained by 19% (n=18).

46% (n -43) of the patients presented early (≤ 6 hours' post burns). 26% presented 6-12 hours' post burns (n=24), 18% presented > 48 hours (n=17) and 11% presented 12-48 hours' post burns (n=10) (Figure 4).

Outcome of patients with burns

47% (n=44) of the patients recovered and were discharged

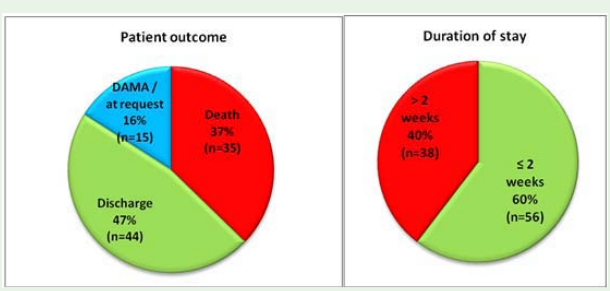

Figure 5: Distribution of patients based on outcome and duration of stay.

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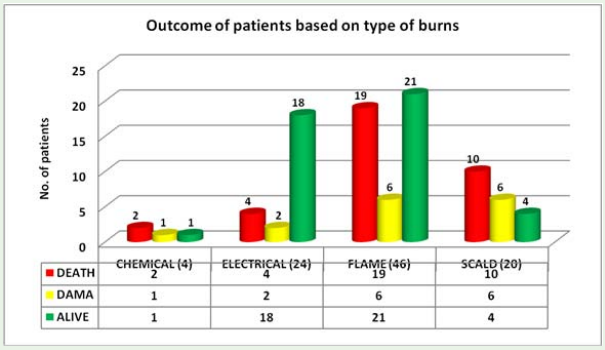

Figure 6: Comparison between type of burns with outcome of patients.

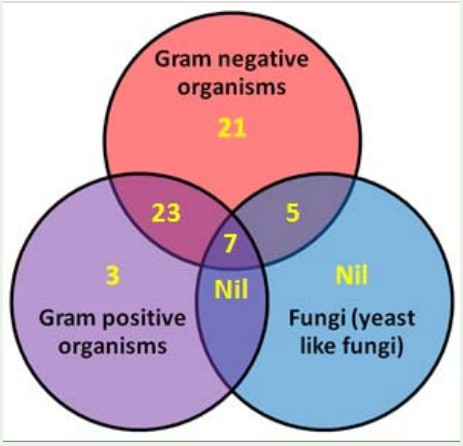

Figure 7: Number of burns patients with various combination of infections (n=59).

from the hospital. Mortality rate observed was 37% (n=35) and the remaining 16% patients (n=15) were discharged against medical advice (Figure 5). Length of stay of burns patients was ≤ 2 weeks in 60% (n=56) and > 2 weeks in 40% patients (n=38) (Figure 5).

Mortality rate was highest among patients who sustained flame burns (54.3%). Scald burns had the next highest mortality rate of 28.6%, followed by 11.4% mortality in electrical burns and 5.7% mortality with chemical burns (Figure 6).

It was noted that there was significant correlation between type of burns and mortality, r (92) =0.249, p=0.015 (Pearson`s correlation).

Microbiological analysis

A total of 166 clinical samples were sent for culture and sensitivity. Analysis of blood cultures, urine, tracheal and tissue/pus cultures revealed a total culture positivity of 67.5%, with the most common isolates being from tissue/pus samples (Table 1).Various combinations of organisms co-existed in 59 out of 94patients. Commonest combination was that of Gram negative and Gram positive organisms in 23 patients. Other combinations were that of Gram negative and yeast like fungi in 5 patients. An interesting combination of Gram positive, Gram negative and yeast like fungi were observed in 7 patients (Figure 7). Detailed description on organism profile is portrayed in table 2. All significant clinical isolates were tested for susceptibility by Kirby Bauer disk diffusion method using standard protocols.

Table 1: Distribution of cultures from burns patients and their positivity.

Clinical Samples	Total No. Of Patients' Cultures Sent	No. Of Positive Cultures	Percentage Of Culture Positivity
Blood	69	50	72.5%
Urine	53	24	45.3%
Pus/Tissue/Wound Swab	29	28	96.6%
Tracheal Aspirate	15	11	73.3%

Table 2: Concordance of clinical isolates from various samples of burns patients (n=219).

Type of organism	Blood	Tissue / Pus / Wound swab	Urine	Tracheal aspirate
Gram negative bacilli				
Pseudomonas species	23	19	1	6
Klebsiella species	22	18	6	2
Acinetobacter species	13	9	1	7
Proteus mirabilis	2	7	1	-
NFGNB	6	1	1	-
Others (E.coli, Enterobacter, Citrobacter)	10	3	5	1
Total Gram negatives : 164	**76**	**57**	**15**	**16**
Gram positive cocci				
Enterococcus species	14	6	3	-
MRCoNS	7	2	-	1
MRSA	2	1	-	-
Streptococcus species	2	1	-	-
MSSA	-	2	-	-
Total Gram positives : 41	**25**	**12**	**3**	**1**
Fungi				
Candida species	3	-	9	-
Trichosporon	-	-	2	-
Total Fungi : 14	**3**	**-**	**11**	**-**
TOTAL Isolates : 219	**104**	**69**	**29**	**17**

Commonly occurring complications among our patients especially leading to death were ARDS, sepsis, coagulopathy, acute kidney injury.

Discussion

Epidemiological data of burns patients varies with time and geographic location. Over the years, there is a change in the pattern of demographic, clinical as well as microbiological profile of patients affected with burns [1]. Continuous updates and analysis of burns patients are therefore necessary to supplement treatment protocols for better outcomes.

Our retrospective analysis included all patients who were admitted with burns in our Critical Care Unit of Apollo Specialty Hospitals, Vanagaram. We observed that most of our patients were males which are contrary to most other studies from Nepal, Karnataka, Kashmir, New Delhi [2-5]. This was an interesting finding and the probable reason could be because most of our patients sustained burns at their work places. Supportive evidence to this was the low percentage of patients with depression, thus making self-immolation the least common cause of burn incidents in our study. A study published by Sivaramet al from Pondicherry, India differs from ours by showing a high percentage of burns due to self-immolation [6]. Another study by Kumar V has also shown high incidence of burns due to self-immolation due to depression among married women [7]. Our encounter with cases of self-immolation due to depression was much lesser than the above reports. Females sustaining burns in developing nations has also been attributed to those engaged in cooking at floor level in villages. Being a tertiary care center in a metropolitan city, this has skipped the list of common etiologies. However, 35% female patients who presented to us had a history of accidental thermal burns at home.

Our youngest patient was 15 years old. Mean age of burns patients in our study was 40.76 years, being consistent with a systemic review from Nepal [2]. Authors from Ghana, Africa and Kashmir, India have reported maximum incidence of burns in children below 10 years of age [4,8]. Our study included only adults and children were excluded as they were referred to a dedicated Children`s Hospital for further management. Thermal burns were the commonest type of burns in our study as well as most other studies from developing countries [9]. In a study from Vellore among pediatric burns patients, the authors have reported scald burns as the most common type followed by flame burns [10]. This emphasizes the variations in type of burns among different age groups of patients. It may thus be postulated that adults are more susceptible to flame burns and children are susceptible to scald and electrical burns.

Total body surface area affected was calculated using Lund & Browder formula. Many of our patients had sustained >40% burns, whereas other studies in and outside India have reported majority of patients with <40% burns. This could be due to the availability of a well-established unit for care of burns patients in our hospital which saw a good inflow of about 73.4% patients referred from outside hospitals. Although the mean percentage of burns was high among our patients, the mortality rate was relatively low. Mortality rate in our study was 37%, whereas other studies have reported mortality rates as follows: 56.5% from Solapur, Maharashtra in 1996 [11], 58.26% from Ahmedabad, Gujarat in 2003 [12], 52.33% from Chennai, Tamil Nadu in 1993 [13]. Authors from Madurai, South India have also reported high mortality rate of 57.33% in 2008 [14].

The existing paradigm on infections among patients with burns is in the sequence of colonization with microorganisms, burn wound infection and finally, blood stream infection. The same was observed among our patients with 96.6% culture positivity in tissue and pus cultures. Most of these wound infections start with biofilm formation [9]. Biofilms are commonly produced by Gram negative organisms growing as a slimy layer over solid surfaces. About 95% wound infections in our patients were caused by Gram negative organisms which probably started off as biofilms.

Fungal infections are an evolving threat in burn units. It is important to anticipate and identify fungi, as many of the Candida species are recalcitrant to commonly used antifungal therapy [15]. Invasive fungal infections can result due to many factors such as long term use of antibiotics, immunosuppression such as diabetes, continuous long term mechanical ventilation, parenteral nutrition etc [16]. The mean percentage of burns in patients who developed fungal infections in this study was 62.5% and mortality rate was 71.4%. The mean percentage of burns in patients with fungal infections was reported to be lesser than ours (34.8%) in a study by Ballard J et al [17]. We found that burns patients who develop fungal infection have a high mortality rate when compared to those who do not.

Multidrug resistant organisms are not only a threat to infection control practices but have become red alerts in facilities catering to burns patients. Our clinical isolates from patients showed a steady rise in multidrug resistant pathogens from 40% to 86.2% over the past three years. Authors from Brazil have also reported such alarming rise in invasive multidrug resistant infections among their burns patients [18].

Interventions such as continuous training in work places for those at risk of exposure to thermal burns have proved to reduce burns incidents especially in developed countries. In developing countries like India, this awareness is still sub optimal. This is the reason why studies like ours might throw light on the importance of creating awareness and availability of basic facilities for prevention of burn injuries at home and in work places.

Anticipating the type of infections in burns patients would greatly influence and help in choice of antibiotics in patients with suspected burn wound infections thereby preventing the development of blood stream infections and septic shock.

Conclusion

Burns are major health hazards which are associated with high mortality and morbidity. We highlight key demographic, clinical and microbiological data of all the burns patients from a single center tertiary hospital in south India. This knowledge should help develop better strategies for the management and prevention of mortality due to burns.

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