Epidemiology of Burns in a Tertiary Care Centre in South India - A Retrospective Observational Study

ABSTRACT

Background In a country like India, where the number of patients presenting with burns is quite significant, not much epidemiological data are available for the same. These data are very important to better understand the magnitude of the problem, to implement and improve preventive measures, and to further improve the approach towards burns patients.

Methods This is a retrospective study conducted in the Department of Surgery, S N Medical College and H S K Hospital and Research Centre, Bagalkot; wherein all the cases of burns admitted in the hospital between January 2013 to November 2015 were analyzed. The data related to age, sex, cause of burns, mode of burns, total body surface area of burns, involvement of the respiratory tract, co-morbid conditions, number of days of hospital stay, outcome, time between admission and death, and cause of death were analyzed.

Results A total of 174 cases admitted to the burns ward were evaluated where 34.5% males and 65.5% females with a male:female ratio of 1:1.9. 63.22% of all patients were from the age group of 21–40 years. A total mortality of 42.53% was seen, with the highest mortality of 27.59% in the age group 21–40 years. 40.80% of the patients had upper respiratory tract involvement, of which 84.51% eventually succumbed to death. Of the total deaths, 41.89% were due to hypovolemic shock, mainly during the first four days; and 58.11% due to septicemic shock, mainly after 5 days of admission.

INTRODUCTION

The patients with burns are not an uncommon presentation to doctors especially in the Indian sub-continent. The numbers are higher in low- and middle-income countries with nearly half of them occurring in the South East Asian region. It is estimated that nearly one million people are affected by moderate to severe burns in India, annually. In spite of such high numbers, there is not much epidemiological data available presently.

Burns is not only considered to be a major cause of mortality but also a common cause of morbidity, disability, disfigurement and prolonged hospitalization. Morbidity and mortality due to burns have a multi factorial causation, which includes various factors like the thickness of burns, total body surface area, age, co-morbid conditions, and other conditions such as involvement of the respiratory tract. Some studies have shown a decrease in the mortality rate in the last decades, which may be due to the availability of better medical facilities. Multi organ failure has been seen to be the main cause of late mortality in patients with burns. This multi organ failure is usually due to hypovolemic or septic shock.

As burns is a preventable cause, the study of social and environmental factors associated with the affected age groups and the sex of the population is of paramount importance, and the results derived can be used to improve or implement preventive measures. It should also be kept in mind that, often patients with burns require prolonged intensive treatment, the cost of such treatment cannot be neglected, especially for the patients coming from the lower socio-economic society. Also, fire-related burns are one of the leading causes of disability-adjusted life years (DALYs) lost in low-income and middle-income countries.
The rear every few hospitals in India, that have the infrastructure and a dedicated burns unit to manage burn patients, so a study like this with its aim to evaluate the epidemiology of patients with burns which presented at a tertiary care centre can give us an estimate of the magnitude of the problem throughout the country.

**MATERIAL AND METHODS**

This is are retrospective study conducted in the Department of General surgery of S N Medical College and H S K Hospital and Research Centre, Bagalkot, which is a tertiary care centre. All the patients admitted with the complaints of burns from January 2013 to November 2015 were analyzed. All the data related to age, sex, cause of burns, mode of burns, total body surface area of burns, involvement of the respiratory tract, co-morbid conditions, number of days of hospital stay, outcome, time between admission and death, and cause of death were taken in to consideration and analyzed.

**Inclusion criteria**

All patients with burns admitted to S N Medical College and H S K Hospital and Research Centre, Bagalkot between January 2013 and November 2015.

**Exclusion criteria**

As this is a retrospective study, all the available patient data were evaluated, and no exclusions were made.

**Analysis**

All the data collected were tabulated in Microsoft excel and subsequently analyzed and presented with the help of Microsoft office.

**RESULTS**

A total of 186 patients were admitted to the burns wards between January 2013 and November 2015. Out of these, 12 patients took discharge against medical advice before the completion of the treatment. So, excluding the patients discharged against medical advice, all the data are calculated on the remaining 174 patients.

**Age**

Approximately, 63.22% of the patients belonged to the age group 21 to 40 years, constituting the major part. Around 16.09% to the age group 11 to 20 years. This was followed by the age group > 61 years (Geriatric) constituting 9.77%, age group 41–60 years constituting 6.90% and the age group < 10 years constituting 4.02% (Table 1).

**Sex**

34.5% (60 out of 174) of all patients were males whereas 65.5% (114 out of 174) were females. A wide difference was seen in male:female ratio for the age groups. Overall, female patients were almost double compared to males with male:female ratio being 1:1.9. Maximum difference seen in the age group 11–20 years, where the male: female ratio was 1:4.6. This was followed by age group <10 years, where the male:female ratio was 1:2.5; age group 21–40 years had ratio 1:1.75 and the age group of >61 years had a ratio of 1:1.42. Interestingly, in the age group 41–60 years, a ratio of 1:1 was seen (Table 1).

**Types of burns**

In 168 patients (96.55%), the injury was caused due to flames. 5 patients (2.87%) gave a history of electrical burns and 1 patient (0.57%) gave a history of scalds.

**Cause of burns**

Almost all the cases (173 i.e. 99.43%) were of accidental burns, whereas in 1 patient (0.57%) the cause of burns was suicidal.

**Extent of burns according to total body surface area**

According to the total body surface area involved in burns, the patients were divided into 5 groups: 0–10%, 11–20%, 21–50%, 51–80% and >81%. Majority of

<table>
<thead>
<tr>
<th>Age group</th>
<th>Total patients</th>
<th>Male: Female ratio</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric (&lt;10)</td>
<td>7 4.02</td>
<td>2 5 1:2.5</td>
<td>0.57 0 1 20</td>
</tr>
<tr>
<td>Adolescent (11–20)</td>
<td>28 16.09</td>
<td>5 23 1:4.6</td>
<td>8.05 1 20 13 56.52</td>
</tr>
<tr>
<td>Young adult (21–40)</td>
<td>110 63.22</td>
<td>40 70 1:1.75</td>
<td>27.59 12 30 36 51.43</td>
</tr>
<tr>
<td>Old adult (41–60)</td>
<td>12 6.90</td>
<td>6 6 1:1</td>
<td>2.87 3 50 2 33.33</td>
</tr>
<tr>
<td>Geriatric (&gt;61)</td>
<td>17 9.77</td>
<td>7 10 1:1.42</td>
<td>3.45 4 57.14 2 20</td>
</tr>
<tr>
<td>Total</td>
<td>174 100 60 114</td>
<td>1:1.9</td>
<td>42.53 20 33.33 54 47.37</td>
</tr>
</tbody>
</table>
the patients that is 31.61% showed burns between 21 and 50%. This was followed by 24.14% patients with 51–80% burns, 22.41% patients with >81% burns, 15.52% patients with 11–20% burns and only 6.32% patients with 0–10% burns. It is worth noting here the wide difference between male and female patients presenting with burns above 51%; with male: female ratio being 1:2.86. (Table 2).

**Mortality**

An overall mortality of 42.53% was seen in the whole study.

**Relation between age and mortality**

Of the total 42.53% mortality, the highest mortality of 27.59% was seen in the age group 21–40 years. This was followed by the age group 11–20 years with 8.05%, >61 years age group with 3.45% 41–60 years with 2.87% and <10 years with 0.57% (Table 1).

**Relation between sex and mortality**

Highest mortality of 56.52% was seen in the females of age group 11–20 years. This was followed by 51.43% mortality in the females of age group 21–40 years. On a contrary, higher mortality was seen in males above 41 years age. A mortality of 57.14% in males of age group >61 years and 50% in males of 41–60 years age. Age group of 0–10 years showed a lesser mortality comparatively with 0% male mortality and 20% female mortality (Table 1).

**Mortality in relation to extent of burns**

Highest mortality was seen in patients with >81% burns which had 97.44% mortality. Only 1 patient of the 39 patients with >81% burns survived. This was followed by 64.29% mortality in patients with 51–80%, followed by 14.55% in patients with 21–50% burns and 3.70% mortality in patients with 11–20% burns. A “0%” mortality was seen in burns less than 10%. (Table 2).

**Time between admission and death**

The period of highest mortality was seen between 3 and 7 days after admission where 36.49% of all deaths occurred. This was followed by 28.38% deaths between 8 and 30 days. 16.22% patients died within 24–48 years and 14.86% died within 24 h of admission. 4.05% patients died after >31 days of admission (Table 3). The longest period between the admission and the death of a patient was 70 days for a female patient with 41–50% burns.

**Period of hospital stay in patients who improved**

Of the 174 patients admitted to the burns ward, 100 were discharged after completing treatment. Of these 38% were discharged between 8 and 30 days of admission. This was followed 28% being discharged after more than 31 days, 25% were discharged between 3 and 7 days, 5% between 24 and 48 h and 4% were discharged with 24 h of admission. (Table 4). The longest period between admission and discharge was 78 days for a male patient with 51–60% burns.
Involvement of upper respiratory tract
Out of the total 174 patients, 71 patients (40.80%) were found to have upper respiratory tract burns. Of these 60 patients (84.51%) eventually succumbed to death.

Cause of death and relation to period of hospitalization before death
In all the patients who did not survive, the cause of death was either seen to be septicemic shock or a hypovolemic shock. Of the 74 deaths, 43 patients (58.11%) were due to septicemic shock whereas 31 patients (41.89%) were in hypovolemic shock. Most of the deaths in the first 4 days were due to hypovolemic shock (86.11%), whereas later on were due to septicemic shock.

DISCUSSION
The data presented here has been collected at a tertiary care hospital and research centre in Karnataka. The centre has a well-equipped and dedicated burns ward along with burns ICU.

Over the past years, a declining trend of mortality has been seen in developed countries, but in the developing countries the mortality is still high. For patients with burns, not only mortality, but also morbidity and the quality of life post-incident is of considerable significance as the patients who survive are left not only physically but also socially and mentally handicapped.

Of the total patients under study here, children (0–10 years) were 4.02%; which is lower than incidence of 9.1% as reported by M. Subrahmanyan. The highest incidence was found among the age groups 21–40 years, constituting 63.22% of the total patients. Here, the number of females was found to be higher than the males. This may be due to the reason that age 21–40 years is the age where the individuals are actively working and are exposed to hazards. The more number of females may be due to the reason that their increased involvement in the kitchen.

A total male:female ratio of 1:1.9 was seen. But a much higher ratio was seen in the age group 11–20 years, where male:female ratio was 1:4.6. This may also be attributed to there as on that during this age, females start helping their mother in the kitchen, hence more exposed to the hazards of fire. Burns due to the flames were 96.55% which were consistent with the findings reported in other studies from India. 2.87% of patients reported with electrical burns whereas only 1 patient was reported with burns due to scalds.

It is with noting here that only 1 patient reported with suicidal burns. This contradicts findings from other studies reporting higher incidence of suicidal burns. But these data surely need more study.

An overall mortality of 42.53% was seen. Only 1 patient with more than 81% burns survived. In patients with 51–80% burns mortality was 64.29%. Consistently, in all the groups, female mortality was higher due to more number of female patients. But, it is worth noting that as the age increased, the mortality in males increased. 57.14% mortality was seen in males of >61 years in comparison to 20% in females of the same age group and 50% mortality in males of age group 41–60 years in comparison to 33.33% mortality in the females of the same age group.

67.57% of the deaths occurred in the first 7 days of admission with 31.08% of the deaths occurring in the first 48 h. 86.11% of the deaths that occurred in the first 4 days were due to hypovolemic shock, whereas the cause of all the death after 5 days was septicemic shock. Early deaths in patients with burns are mostly due to hypovolemic shock. Infections and septicemic shock attribute to deaths after a longer period of stay. Longer the stay of the patient in the hospital, more are chances of infections from other patients admitted in the same ward. In total, 58.11% of all deaths were due to septicemic shock whereas 41.89% were due to hypovolemic shock.

The duration of stay not only affects the treatment and but also affects the patients and relatives socially, mentally, physically and financially. Of the total patients discharged after treatment, 28% of the patients stayed for more than 31 days. This long stays are quite considerable for patients coming from the lower socio-economic status for whom medical and surgical treatment for so long along with the expenses of attenders staying in hospital with patients can be stressful, especially in developing countries like India where the cost of managing such cases is still high. The longest a patient stayed in this study was a male with 51–60% burns, who stayed for 78 days.

Various studies have been conducted that correlate total body surface area of burns, inhalational burns and mortality. In our study here, 40.80% patients had upper respiratory tract burns and of these 84.51% of the patients succumbed to death. So it is seen that involvement of upper respiratory tract is a good mortality indicator.

Burns are a major cause of mortality and morbidity, which can cripple a patient physically, mentally, socially, emotionally and financially. But, most of the burns are preventable. The main stress here should be on

<table>
<thead>
<tr>
<th>Hospital stay before death</th>
<th>Septicemic shock</th>
<th>Hypovolemic shock</th>
</tr>
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<tbody>
<tr>
<td>&lt; 24 h</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>24–48 h</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>3–4 days</td>
<td>2</td>
<td>11</td>
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<tr>
<td>5–7 days</td>
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<td>0</td>
</tr>
<tr>
<td>8–30 days</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 31 days</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>31</td>
</tr>
</tbody>
</table>
preventing the burns. By educating the population about the hazards and common causes of burns or related accidents in day today life and methods of prevention and protection; the incidence of burns can be significantly decreased. More studies on burns epidemiology can help us to formulate and educate the general population of the preventive and protective measures.

**REFERENCES**