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The problem of burns

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ABSTRACT

Background: Burns due to accidents are a common cause of morbidity and mortality in the Indian sub-continent. The causes being preventive, warrant a better understanding of the epidemiology to know the seriousness of the situation, implement better medical care and prevent such accidents. Aim was to study the morbidity and mortality related to percentage of burns.
Methods: This is a retrospective observational study where patients admitted with burns 2013 and 2015 were evaluated. Data with respect to sex, age, percentage of burns, air-way burns, mode and cause of burns, cause of death and length of hospitalization were analyzed.
Results: 65.3% of the patients were females and 34.7% males, with a male: female ratio of 0.53:1. A total mortality of 43.71% was seen. Maximum patients belonged to age group 21-40 years which also constituted 28.74% (highest) of the above total mortality. More than 50 % mortality was seen in patients with more than 41% burns. Air way burns were present in 41.31% of the cases; of which 85.51% of cases did not survive. Death due to hypovolemic shock (42.47%) was the main cause of death in the initial 4 days of admission; whereas septicemic shock (57.53%) from the 5th day onward.
Conclusions: Morbidity and mortality due to burns is still very high in India, especially in young adults of age groups 21- 40 years. A higher case load for females as seen, being nearly double in in relation to males. Better fluid resuscitation regimens with adequate control of infection is the need of the hour to bring down the mortality. Female sex and more than 41% burns predicts higher mortality. Involvement of the respiratory tract, also predicts higher mortality and may be taken as a reliable indicator of the severity of burns. In the present scenario, we should stress more over the prevention of burns, to easily make available affordable and cheap medical care for the patients and to minimize post burn disability as much as possible.

Keywords: Air-way burns, Burns, Epidemiology of burns, Morbidity and mortality related to burns, Respiratory tract burns

INTRODUCTION

Burns, which may or may not be accidental in nature are a major cause of morbidity and mortality, especially in low and middle income countries where fire related burns are one of the leading cause of disability-adjusted life years (DALYs).[1] The South East Asian region especially was seen to have a higher incidence, with approximately half the case load. A higher magnitude of the problem is estimated in developing countries like India where deaths due to burns stand second only to deaths due to road traffic accidents.[2] Self-inflicted suicidal burns are also frequently seen in India.[3,4] A decrease in mortality has been shown in some studies in the past few decades

which may be attributed to the developing medical facilities.[5]

The spectrum and pattern of burns in developing countries are quite different from those in developed countries where more non-intentional injuries are seen to be more extensive.[6] Morbidity and mortality related to burns depends on various factors like age, percentage of burns, thickness of burns, airway burns and other co-morbid conditions.

Multi organ failure is usually seen to be cause the main cause of death, which may be due to hypovolemic and septicemic shock. Not only a high mortality, burns also lead to significant morbidity, prolonged hospital stay, disfigurement and disability.[7] Some patients may require surgery which along with prolonged intensive treatment causes financial burdens on the patients.

Another cause for a higher morbidity and mortality in India is the fewer availability of well-equipped hospitals which can give standard and quality medical care for burns patients.[8] Most of the burns related accidents are preventable, and hence study to co-relate the various factors affecting the severity and outcome of patients carries great importance and will help us to improve the care provided. Data from the study can be used to implement and improve preventive measures and to educate people about hazards and accidents.[2]

METHODS

This is a retrospective observational study conducted at a tertiary care hospital in Karnataka, India (SNMC & HSK Hospital, Bagalkot). The center has a dedicated burns ICU and burns ward to treat burns patients. All the cases admitted to burns unit between the years 2013 and 2015 were evaluated from the case files. Data with respect to sex, age, percentage of burns, air-way burns, mode and cause of burns, cause of death and length of hospitalization were analyzed.

Inclusion criteria

- All cases admitted to the center between the years 2013 to 2015, above the age 11 years were included.

Exclusion criteria

- Cases between ages 0 to 10 years were not included in this study
- Patients who went against medical advice before completion of treatment have not been included in the study.

All the available data available in the case sheets was collected and tabulated into Microsoft Excel and evaluated. The report was made in Microsoft Word.

RESULTS

167 patients admitted to burns ward during the time span of 3 years were evaluated here.

Age

All the patients were divided into 4 age groups; 11- 20 years, 21- 40 years, 41- 60 years and >61 years age. Among these, age group 21- 40 years had the maximum number of patients constituting 65.86%. This was followed by 16.77% patients in age group 11- 20 years, 10.18% in age group > 61years and 7.18% in age group 41-60 years.

Table 1: Distribution and mortality according to age groups and sex.

Incidence						Mortality						
Age group	**Total**	**Total %**	**M**	**F**	**M:F ratio**	**Total**	**% mortality in the age group**	**% mortality of the total**	**M**	**% Male mortality**	**F**	**% Female mortality**
Adolescent (11-20)	28	16.77	5	23	0.22:1	14	50	8.38	1	20	13	56.52
young adult (21-40)	110	65.87	40	70	0.57:1	48	43.64	28.74	12	30	36	51.43
old adult (41-60)	12	7.19	6	6	1:1	5	41.67	2.99	3	50	2	33.33
geriatric (>61)	17	10.18	7	10	0.7:1	6	35.29	3.59	4	57.14	2	20
Total	**167**	**100**	**58**	**109**	**0.53:1**	**73**	**43.71**	**43.71**	**20**	**34.48**	**53**	**48.62**

M: Male, F: Female

Table 2: Distribution and mortality according to TBSA.

Incidence					Mortality					
% of burns	M	F	Total	Percentage	M	% male mortality in group	F	% female mortality in group	Total	Percentage
0-10%	6	3	9	5.39	0	0	0	0	0	0
11-20%	10	16	26	15.57	1	10	0	0	1	3.85
21-50%	21	31	52	31.14	2	9.52	6	19.35	8	15.38
51-80%	12	29	41	24.55	8	66.67	18	62.07	26	65.85
>81%	9	30	39	23.35	9	100	29	96.67	38	97.44
Total	**58**	**109**	**167**	**100**	**20**	**34.48**	**53**	**48.62**	**73**	**43.71**

Table 3: Length of stay of patients who survived and relation to percentage of burns.

Incidence	Discharge					Total
% of burns	within 24 hours	24-48 hours	3-7 days	8-30 days	>31 days	
0-10%	1	2	6	0	0	9
11-20%	0	3	8	11	3	25
21-50%	2	0	5	22	15	44
51-80%	0	0	3	4	8	15
>81%	0	0	0	0	1	1
Total	**3 (3.19%)**	**5 (5.31%)**	**22 (23.40%)**	**37 (39.36%)**	**27 (28.72%)**	**94**

Table 4: Duration of hospital stay before death and relation to percentage of burns.

Incidence	Mortality					Total
% of burns	within 24 hours	24-48 hours	3-7 days	8-30 days	>31 days	
0-10%	0	0	0	0	0	0
11-20%	0	0	1	0	0	1
21-50%	1	0	1	3	3	8
51-80%	1	2	11	12	0	26
>81%	9	10	13	6	0	38
Total	**11 (15.07%)**	**12 (16.43%)**	**26 (35.62%)**	**21 (28.77%)**	**3 (4.11%)**	**73**

Table 5: Cause of death and relation to period of hospitalization before death.

Time before death	Cause of death	
	Hypovolemic shock	Septicemic shock
< 24 hours	9	2
24-48 hours	11	1
3-4 days	11	2
5-7 days	0	13
8-30 days	0	21
> 31 days	0	3
Total	**31 (42.46%)**	**42 (57.54%)**

Sex

There was a wide variation seen between number of male and female patients in all age groups. Total 58 patients (34.7%) were males and remaining 109 (65.26%) were females. Total male: female ratio of 0.53: 1 was seen. Highest difference was seen in age group 11- 20 years with a male: female ratio of 0.22: 1, whereas an equal number of males and females were present in the age group 41- 60 years (Table 1).

Extent of burns according to total body surface area

All the patients were divided into 5 groups depending on the % of burns; 0-10%, 11-20%, 21-50%, 51-80% and > 81%. Maximum patients came in with burns ranging between 21-50% constituting 31.14%. The groups 51-80%, > 81%, 11-20% and 0-10% had 24.55%, 23.35%, 15.57% and 5.39% patients respectively (Table 2).

Mortality

Of the 167 patients evaluated, 73 did not survive, giving a mortality of 43.71%.

Relation between age and mortality

Percentage mortality in individual age groups was calculated. Mortality in all groups was seen to follow almost similar trend. Highest 50% mortality was seen in

11-20-year age group. Age group 21-40 year, 41-60 year, and > 61 year were found to have a mortality of 43.64%, 41.67% and 35.29% respectively.

Percentage mortality in age groups with relation to total number of patients in the study was also calculated. Age group 21-40 years had highest mortality with 28.74% out of total 43.71%. Remaining age groups, 11-20 years, >61 years and 41- 60 years were seen to have a mortality of 8.38%, 3.59% and 2.99% of the total mortality respectively (Table 1).

Relation between sex and mortality

A wide variation of mortality among both the sexes was seen in the different age groups. 48.62% of all the females and 34.48% of all the males in the study died. Highest mortality was seen in males of age group > 61 years where mortality was 57.14%. This was followed by females of 11-20 years' age group who showed a mortality of 56.52%. Lowest mortality of 20 % was seen in males of 11-20 years' age group as well as females of >61 years age group (Table 1).

Mortality in relation to extent of burns

Mortality and percentage of burns were seen to have a direct relation where mortality increased with the % of burns. 97.43% mortality was seen in patients with > 81% burns. In >81% burns, males showed 100 % mortality whereas females showed 96.67% mortality. This was followed by 66.67% mortality in males and 62.07% mortality in females with 51- 80% burns with a total mortality of 65.85% in the group. No mortality was seen in patients with <10% burns, 21- 30% and 31- 40% burns. 50% mortality was seen in patients with 41- 50% burns. Thereafter the mortality kept increasing with the percentage of burns (Table 2).

Length of stay of patients who were discharged after improvement and relation with % of burns.

The length of stay was compared with the % of burns of the patients. 39.36% patients were discharged after 8- 30 days of treatment. 28.72% patients required treatment for more than 31 days. 3.19% patients were discharged within 24 hours of admission. Table 3 shows relation of length of stay to % of burns (Table 3).

Length of stay before death and relation to percentage of burns

The length of hospital stay before death was compared to the % of burns of the patient. Maximum mortality of 35.62% was seen between 3 to 7 days. 28.77% mortality was seen between 8 to 30 days. Least deaths were when the stay was more than 31 days with mortality was 4.11%. Table 4 shows relation of length of stay before death and relation to % of burns.

Mortality in relation to air way burns

41.31% of the patients (69 out of 167) had air way burns. Among these patients with air way involvement, 85.51% of the patients (59 patients died out of 69 with airway burns) did not survive.

Cause of death and relation with length of stay before death

Cause of death was seen to be either hypovolemic shock or septicemic shock. The cause of death was compared with length of stay before death. Of the total mortality, 42.47% of mortality was due to hypovolemic shock where as 57.53% of deaths were due to septicemic shock. Most hypovolemic shocks were during the initial 3-4 days of treatment whereas septicemic shock as a cause of death was seen after 4-5 day of treatment (Table 5).

Types and mode of burns

Most of the burns (96.41%), were due to burns, whereas around 3% were due electric current and only around 0.5% of the burns were scalds. 99.40% of burns were accidental, whereas 0.60% were suicidal.

DISCUSSION

Patients presenting with burns is a common incidence in the developing countries. Though a decrease in mortality has been reported in the past decades, but the numbers are still high; especially in the developing countries.[3] The cause of higher mortality and morbidity in developing countries is the limited number of centers having the infrastructure and the facilities to treat such patients.[8] Though the treatment has evolved over the time, it is still a formidable challenge to manage burns patients.[6] Not only the management, the victims are usually left physically, socially and mentally handicapped post discharge.[6]

Table 1 shows the distribution of patients according to age and sex. The maximum number of patients belonged to age group 21-40 years with 65.87% of the total patients. This finding was consistent with findings reported from other studies.[2] The reason for higher incidence in this age group may be attributed to the fact that this age group constitutes the actively working group. It was also seen that the female incidence in this age group was higher than the males with a male: female ratio of 0.57:1. An even wider difference between number of males and females was seen in the age group 11- 20 years with a male: female ratio of 0.22:1. The reason for this may be due to the higher involvement of females of these age groups in the kitchen and cooking activities, hence more exposed to burns hazards. It has been reported by some authors that women, especially in developing countries like India wear loose fitting clothes like dupatta, saree, etc., which are more prone to catch fire.[9-13] Men are too at risk because of loose fitting

clothes like lungi and dhoti.[3] An equal male: female ratio of 1:1 was seen in the age group 41-60 years. The total male: female ratio in the whole study was found to be 0.53:1. Numbers of females were almost double as compared to males.

The total mortality seen in the whole study was 43.71%, which is lower than as reported from some other studies.[6] Mortality of all the females in the study was 48.62% which was higher than the mortality of males which was 34.48%. Females showing higher mortality have also been reported by Ganesamoni S.[6] Of the total 43.71% mortality, 28.74% patients belonged to the age group 21-40 years. Higher mortality in this group may be attributed to the fact that this group also had the highest incidence of patients. As seen from Table 1, as the age increased, male mortality was seen to increase, whereas female mortality decreased. When mortality in specific age groups is compared, highest mortality of 50% is found in age group 11-20 years; whereas lowest mortality of 35.29% was seen in age group >61 years.

Table 2 shows the incidence and mortality according to percentage of burns. When compared with the percentage of burns, maximum number of patients (31.14%) were brought in with 21-50% burns. This was followed by 24.55% patients with 51-80% burns. Lowest number of patients (5.39%) came with < 10% burns. This may be due to the fact that our hospital being a tertiary care center, most patients are referred to us from peripheries. Patients with small percentage of burns are treated at hospitals where the patient first presents. Patients with less than 40% burns should good survival rate, whereas patients with 41- 50% showed 50% mortality. The mortality was seen to increase as the percentage of burns increased above 41% with highest mortality in patients with burns of >81%, having a mortality of 97.44%. A shortcoming of this study is that the thickness of the burns was not evaluated. Correlation of thickness of burns with percentage of burns would have given a clearer picture.

96.40% of the burns were due to flames, which has also been reported in other studies.[2,9,14] The second most common cause seen in our study was, 2.99% patients with electrical burns and then next were burns due to scalds (0.60%). This contradicts other studies where scalds are reported as the second most common cause of burns after burns due to flames.[6] Our data also reported higher accidental burns and very few suicidal burns when compared to other studies.[4] This data may not be completely dependable and may need further evaluation. It was seen that 86.11% of the deaths in the first 4 days were due to hypovolemic shock, whereas more of deaths due to septicemia started to appear from the 4th day onwards. After 4th day onward, cause of all the deaths was septicemic shock. This was consistent with results reported from other studies.[6] 42.47% of all deaths were due to hypovolemic shock whereas 57.53% of deaths were due to septicemic shock. The percentages of deaths due to septicemia were very high even though all the patients were kept in a separate burns ward.

Burns are a cause of prolonged hospitalization for patients as the study shows, 39.36% of patients were admitted for 8-30 days and 28.72% of patients had a stay of more than 31 days. In developing countries like India, the cost of treatment of burns cases is still very high.[15] Some patients even had a hospital stay of more than 2 months. Such long stays in the hospital effect the patient and the family physically, mentally, socially, financially as well as emotionally. The cost of prolonged hospital stay and treatment which some-times also requires surgeries exerts financial burden over the patient and the family. Usually along with the patient, a family member also stays in the hospital, whose expenses also cannot be neglected. Even after the treatment, the victims are often left physically disabled. This may hinder their daily activities and some-times may not be able to work to earn a living, thus becoming dependent on the family. Burns especially to the face often leave the patients disfigured for life time, which affects them mentally and socially. 35.62% of the deaths were after 3- 7 days of admission, this was followed by 28.77% of deaths occurring after 8-30 days of stay. Thus, even after prolonged treatment, going up to months, the outcome may not always be favorable.

It was seen in previous studies as well as this study that burns of the upper respiratory tract can also be taken as a good predictor of mortality. Many studies have shown the correlation of mortality, inhalational burns and total body surface area.[2,16-18]

Respiratory tract involvement was assessed by the history of exposure to smoke or presence of singing of nasal hair along with burns of face, presence of carbonaceous black cough, shortness of breath, wheezing, rhonchi or hoarseness of voice. It was seen that 69 (41.32%) of the 167 patients had signs of upper respiratory tract involvement. 59 (85.51%) of the 69 patients did not survive. As suggested by Venus et al., prophylactic intubation and CPAP therapy in burn patients with suspected inhalation injury prevent pulmonary related death in early stage of burn.[19]

Management of burns is a challenging task for the health care provider as well as for the patient and the family. But, most of the burns are preventable.[20] Burns can be prevented by educating the people about the common causes and hazards of burns. Burns at work place can be prevented by implementation of safety measures, appointment in jobs requiring exposure to fire hazards only after adequate training and facilities of quick transfer to hospital in case of accidents. House hold burns can be reduced by encouraging the use of LPG gas and reducing the use of kerosene based stoves. People should be educated to avoid wearing loose clothes in kitchen and supervising the use of fire equipment by the children in kitchen.

CONCLUSION

From the above data, it can fairly be concluded that the incidence and mortality of patients presenting with burns is still high in India. As in most of the cases, the cause of burns was accidental, so our main aim should be at the prevention of burns. Guidelines for employment in jobs with exposure to fire hazards should be implemented. Household burns can be reduced by overseeing activity of children in kitchen, and encouragement of use of LPG gas for cooking instead of kerosene stoves. Increasing percentage of burns, female patients and patients with upper respiratory tract involvement were seen to have a higher mortality. Early prophylactic intubation in patients with inhalational burns should be encouraged, but its complications should also be kept in mind.

The increasing number of deaths due to septicemia after few days of admission suggests a need for implementation for better aseptic precautions in the burns wards. Rational use of organism specific antibiotics should be encouraged. Different patients in the burns wards should also be kept at sufficient distance and the use of materials common between different patients should be discouraged, to curb the spread of infection. The high numbers of deaths due to hypovolemia suggest a need of better fluid resuscitation profiles at the same time reducing the loss of fluid from the body surface. Also, there is a need to increase the number of centers which can provide and quality care to such patients at affordable costs. We need to increase the qualified staff and nursing care, especially trained at burns centres. Duration of stay not only affects the treatment and but also affects the patients and relatives socially, mentally, physically and financially. These centers should be easily accessible and services for referral to higher centers if required should be readily available. An attempt should be made to reduce the extent of disfigurement and disability in the victim's post discharge. Attempt of vocational rehabilitation of the victims and employment in works favorable to their condition post burns should be made.

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