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Original Research Article

Clinico epidemiological study of thermal burns in a tertiary care hospital

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ABSTRACT

Background: Substantial number of people suffers from burn injuries every year in India that make the patients endure disease, surgeries and years of rehabilitation. The higher mortality and prolonged morbidity results in heavy social, economic and clinical burden to the nation. The objective was to study and analyse the socio-demographic profile of burn patients in addition to evaluate the causes, manner and clinical course of burn patients along with its outcome.
Methods: This was a registry based retrospective study on 114 burns patients, admitted in a Tertiary Care Hospital in South India from January 2018 to June 2018. Data were collected and assimilated comprehensively.
Results: The age group of patients ranged from 13-70 years, the mean age being 29 years. The overall male, female to transgender ratio was 0.57:1:0.01. Most of the patients were married (66.66%). The TBSA involvement in burns ranged from 10% to 100% and the mean TBSA was found to be 11.4±2.95. A higher TBSA involvement is associated with an increased risk of mortality and this association between TBSA and mortality was found to be statistically significant ($p<0.05$). Mortality ratio in this study was 51.75% and septic shock (58%) was the most common cause of death followed by hypovolemic shock (42%).
Conclusions: Burns are one of the leading causes of preventable morbidity and mortality, provided the prevention strategies address the hazards of specific burn injuries, awareness education for vulnerable population and targeted first aid training.

Keywords: Burns mortality, Burn microbiology, Epidemiological study, Thermal burns

INTRODUCTION

Burn injuries happen all over the world beyond geographical boundaries and adversely affects mankind. Every year about 300000 people die from burn injuries worldwide (WHO report, 2018).[1] In India more than 20,772 burn associated deaths and more than 10,00,000 nonfatal moderate to severe burns occurred in the year 2007. Every year 15% deaths in India occur due to burn injuries.[2] In all societies, burns represent severe medical, social and psychological issues. Burns have severe financial and psychosocial consequences not only to the persons affected but also to their family and society in general.[3] Physical and psychological afflictions forced on the patients can be stressful to the victims themselves as well as to their families. In developing countries like India, the burn injuries pose severe health concerns due to lack of dedicated burns units and increased cost of quality

therapy that are not readily available.[4] Burn injuries continue to be a demanding problem due to underprivileged medical amenities, lack of safety measures, deficiency of community awareness, poverty and illiteracy. Burn injuries are one of the leading social health problems due to prolonged periods of morbidity, disability and mortality amongst young and middle-aged adults. Burn has also a social dimension, linked with accidental, suicidal or homicidal causes.[5]

Clinical studies addressing the factors contributing to increased mortality clearly indicate the role of microbial infection leading to sepsis and shock. Bacterial colonization and multiplication were much more in burns area than surgical wounds, due to the huge area exposure and prolonged exposure to hospital flora.[6] Infection is one of the major factors of morbidity and mortality of burns patients, 75% of mortality rate of burn injuries interlinked with sepsis specifically in developing countries. Knowledge about the local data on the prevalence of infection, microbiological profile and antimicrobial sensitivity pattern is the basal need to develop efficient burn care facility to minimize mortality due to septic shock.

Epidemiological studies have an essential role in detection of risk factors and high-risk groups.[7] Epidemiological study is the first step in the understanding of precautionary and management strategies.[8]

Despite the significance of burns both from clinical as well as the social point of scrutiny, there is wide insufficiency of research material on burns in India. Thus, this study has been aimed to find out the objects and social reasons of burn injuries and to evaluate the demographic and clinical profile in Thanjavur Medical College.

METHODS

A retrospective descriptive study was carried out in the Department of Plastic Surgery, Thanjavur Medical College, a tertiary care hospital in the delta districts of Tamilnadu. Institutional Ethics Committee approval was obtained.

The study was conducted on 114 patients based on the records over a period of six months ranging from January 2018 to June 2018.

A proforma was used to collect data such as age, sex, place of residence, time of occurrence, place of burn, mode of injury, TBSA involved, degree of burn areas affected, percentage of burns, nature of burns, type of burns and microbiological profile of wound.

All patients above the age of 12 years with different degrees of burns and requiring admission were included in the study. Children under 12 years of age were excluded from the study as author had a separate paediatric burns unit in a different locality. Patients who had taken discharge against medical advice and those declared absconded were also excluded.

The data collected were entered into MS-Excel sheets and analysis was carried out. The information obtained was tabulated and analysed using the software SPSS. Percentages were used in this study to analyse variables.

Mean and standard deviation (SD) were calculated where applicable. Regression test was used as a test of significance and p value of <0.05 was statistically significant. Based on analysis and observation, results were drawn, discussed and compared with other relevant literature.

RESULTS

During the study period, 114 patients were admitted to the burns ward. Out of 114 patients, 39 (34.21%) were males, 74 (64.91%) were females and 1 (0.87%) was transgender. The overall male, female to transgender ratio was 0.57:1:0.01. The age of patients ranged from 13 years to 70 years (Figure 1).

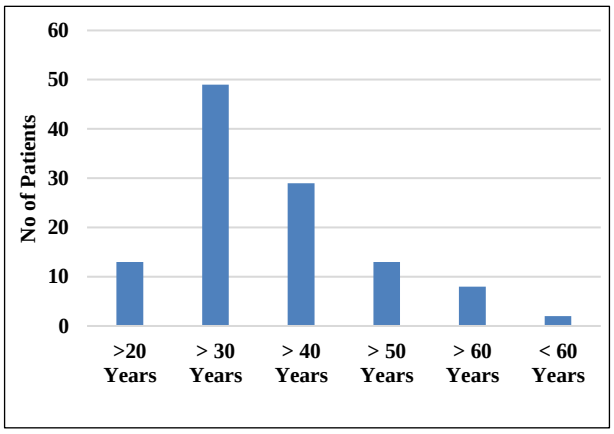

Figure 1: Age group of patients sustained with burns.

Forty-nine patients (42.98%) were young adults in the age group between 21 and 30 years. The mean and standard deviations of ages for the female patients were 27.83±10.65. The mean and standard deviations of ages for the male patients were 39.46±10.52. Most of the patients were in the young adult age groups. Young females constituted the maximum proportion of burn victims followed by young males in the third decade of life. Majority of the patients were married, 66.66% (n=76) and unmarried patients contributed to 33.33% (n=38) (Table 1).

Out of 114 patients, the mode of injury was suicidal, accidental and homicidal. Among the suicidal cases 40.24% were young married females. 82 patients sustained injury by using kerosene to burn themselves with suicidal intention. Out of these 82 cases, 55

(48.24%) were female patients and 26 (22.80%) were male patients and the remaining one was a transgender person. Accidental burn injuries due to explosion of gas cylinder in kitchen and crackers account to a sum of 31cases out of which 21 (18.42%) were females and 10 (8.77%) were males. One young female was a victim of homicidal intention and was burnt by using kerosene contributing to 0.8% of the total study population. Most of the cases sustained burns between 6pm to 11pm.

Table 1: Socio demographic profile of burn patients.

Age group (yrs)	Male (n=39)	Female (n=74)	Trans-gender (n=1)	Total (n=114)	Marital status			
					Married (n=76)		Unmarried (n=38)	
					M	F	M	F
0-10	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
11-20	Nil	13 (13.56%)	Nil	13 (13.56%)	Nil	Nil	Nil	13 (100%)
21-30	14 (35.89%)	35 (47.29%)	Nil	49 (42.98%)	04 (28.57%)	31 (88.57%)	10 (71.42%)	04 (11.42%)
31-40	11 (28.20%)	17 (22.97%)	01 (2.56%)	29 (25.43%)	08 (71.72%)	12 (70.58%)	03 (27.27%)	05 (29.41%)
41-50	08 (20.51%)	05 (6.75%)	Nil	13 (11.40%)	06 (75%)	05 (100%)	02 (25%)	Nil
51-60	05 (12.82%)	03 (4.05%)	Nil	08 (7.01%)	05 (100%)	03 (100%)	Nil	Nil
>60	01 (2.56%)	01 (1.35%)	Nil	02 (1.75%)	01 (100%)	01 (100%)	Nil	Nil

Total Body Surface Area burnt (TBSA)

About 17 patients sustained burns with TBSA of 91-100%. About 45 patients were admitted with TBSA of 51-90% and 35 patients sustained burns with TBSA 21-50%. There was no mortality reported in patients admitted with TBSA 0-40%. 55 patients (48.25%) were discharged after successful treatment with advice for follow-up. 24 out of 55 required skin grafting. 59 patients were expired due to septicemia and other complications of burns (Table 2).

Table 2: Total body surface area burnt and outcome of treatment.

TBSA (%)	N (%)	Discharged	Expired
0-10	06 (5.26)	06	0
11-20	11 (9.64)	11	0
21-30	14 (12.28)	14	0
31-40	09 (7.86)	09	0
41-50	12 (10.52)	09	03
51-60	11 (9.64)	04	07
61-70	11 (9.64)	01	10
71-80	13 (11.40)	01	12
81-90	10 (8.77)	0	10
91-100	17 (14.91)	0	17
	Total	55 (48.25%)	59 (51.75%)

Bacterial profile of burn patients

The most common microorganism isolated from the burn wound was *Staphylococcus aureus* (n=24, 31.16%) followed by Coagulase Negative *Staphylococci* (n=11, 14.28%), *Pseudomonas aeruginosa* (N=7, 9.09%), Gram negative *bacilli* (n=13, 16.88%) and skin commensals (n=7, 9.09%). No bacterial growth was observed in 12 patients with burn wounds (Table 3).

Table 3: Bacterial colonies isolated from wound culture.

Isolates	N=77	%
Staphylococcus aureus	27	35.05
Coagulase Negative *Staphylococci*	11	14.28
Pseudomonas aeruginosa	07	9.09
Micrococcus	06	7.79
Klebsiella sp.	05	6.48
E. coli	03	3.89
Proteus mirabilis	03	3.89
Acinetobacter baumanni	01	1.29
Enterobacter aerogenes	01	1.29
Diphtheroid	01	1.29
No growth	12	15.58

Length of stay

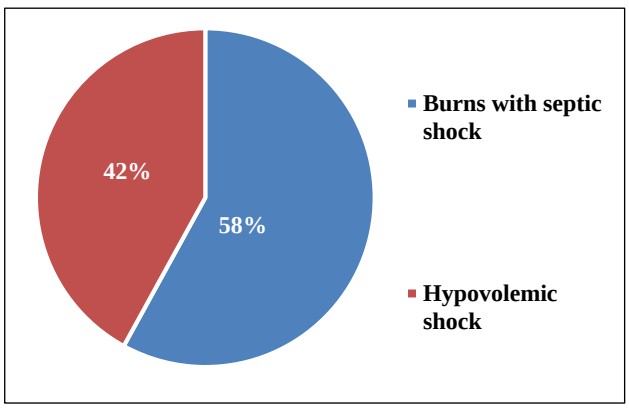

Figure 2: Causes of mortality of burn patients.

Out of 114 patients, 32.45% stayed in hospital for less than one week and 14.91% of patients stayed in for more than 2 months. About 49 patients with 61-100% burns died within 15 days. Septicemia, ARDS, MODS and burn shock were the causes for the mortality (Figure 2).

DISCUSSION

The epidemiology of thermal burns varies in different parts of the globe due to literacy, civilization, social and cultural activities. Since India is a country of various culture and customs, clinical and epidemiological studies are required to evaluate the etiology of thermal burns, population at risk and to assess the preventive measures of burns. Psychological counselling measures can be given to the vulnerable groups.

In this study, majority (68.4%) of the burn's cases were young adults falling in the age group of 21-40 years. Similar studies have been reported by Maske AN et al.[9] The mortality and prolonged morbidity in this productive age group irrespective of the gender imparts a high socio economical loss to the country. The psychological impacts inflicted on the family members definitely affects the quality of their life, worst affected being the children. Author's observation regarding age distribution was in accordance with the data form other parts of the country and is being supported by the global data also.[10]

As per the Census 2011 report of India, the male to female ratio in this region is 1:0.94. Male to female ratio in present study was 0.57:1. The observation of female predominance among burn patients was similar with other studies from Tamil Nadu and the national data from other states also coincides with this observation.[2,3,10,11]

More number of married persons encountered burn injuries compared to unmarried in this study. Among them married young females outnumbered married males. This observation was supported by other studies from various regions of India.[12] On the contrary there is no significant association between marital status and burn injuries in other countries.[13]

The increased percentage of contribution of married young females in this kind of fatal injury throws light on the social and psychological factors prevailing in the society that determines the vulnerability of this subset of population. Regionalized marital practices like dowry, psychological burden in view of relationship with relatives of husband's side, emotional disturbances related to delay of child birth, economic dependence of young married women on their male counterparts, lack of education are all certain serious issues that need to be contemplated upon in view of this young married female predominance among burn victims in this area.

Most of the victims among female are house wives who spend more time in kitchen and have easy access to the most commonly used agent kerosene. Accidental domestic gas explosions also target the female population who are readily available in the kitchen area.

The manner of burn injuries in this study population is mostly suicidal due various factors ranging from trivial marital discrepancies between husband and wife, unemployment, emotional breakdowns to dowry related humiliations and harassments. Marital disharmony drives both men and women equally towards suicidal decisions, whereas dowry related injuries target the female population alone. Unemployment plays important role in men forcing them towards suicidal intentions.

As a whole flame burns are the commonest types of burn injury observed in this study, which is supported by similar data from other states in India.[14] International studies reveal the predominance of other etiologies like electrical and chemical agents.[15,16]

About 17 patients sustained burns with TBSA of 91-100%. About 45 patients were admitted with TBSA of 51-90% and 35 patients sustained burns with TBSA 21-50%. There was no mortality reported in patients admitted with TBSA 0-40%. About 49 patients with 61-100% burns died within 15 days. Septicemia, ARDS, MODS and burn shock were the causes for the mortality. The mortality in this TBSA group is completely preventable if able to provide quality health care by means of dedicated burns care units.

CONCLUSION

Burns are one of the leading causes of preventable morbidity and mortality provided the prevention strategies address the hazards of specific burn injuries, awareness education for vulnerable population and targeted first aid training. Well established burn units are essential to reduce the mortality. Psychologists have a role in relieving the stress related problems among younger generation. Hope after burns must be given to the survived burn patients and physiotherapy and rehabilitation are very important in reducing the morbidity.

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