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Research Article

Clinico-epidemiological study of burns: our experience with 500 patients

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ABSTRACT

Background: Burn injury represents one of the most important public health problems faced by both industrialized and developing country like India. The epidemiological factors of burn injury vary in different regions and countries. Aim of this study was to determine the etiology of burns, analyze the epidemiological features, and study the factors contributing to the mortality of burn patients in our region.
Methods: This prospective descriptive study was conducted in department of surgery at a tertiary care teaching hospital at Solapur from January 2011 to December 2013. All the patients, irrespective of age and sex admitted with diagnosis of burn injury were included in the study. Clinical and epidemiological data collected. Patients were treated according to protocol.
Results: The study was based on 500 burn patients admitted and treated. Most commonly affected age group was 21 to 40 years. Females were more commonly affected than males. Majority of burn injuries occurred in rural areas. Majority of burns were accidental in nature with flame the commonest cause. Maximum incidence of burn observed during winter season. Majority of burn injuries occurred between 5 pm to 11 pm. Labourers were more commonly affected. Majority of burn injuries occurred at home and most of the patients were illiterate.
Conclusions: Flame was the commonest cause of burn injury in our study. Burns are preventable so public health programmes about various etiological factors and their preventive measures are necessary.

Key words: Burn injury, Epidemiology, Mortality

INTRODUCTION

Fire is a boon as well as curse for mankind as it has both served and destroyed mankind since antiquity. Burns represent one of the major health problems in India. It has tremendous medico legal importance in our country because burn is considered as cause of unnatural death.

Burn is stressful situation for both patients and their families. Patients suffering from severe burns frequently die while survives may have miserable life due to complications of burn injury. Cost for the treatment of burn patients is high as multiple specialities are involved in management of these patients. This is important in developing country like India where majority of people live below poverty line. All this makes it important that more stress is laid on burn prevention rather than burn care.

Epidemiological studies have an important role in recognition of risk factors and high-risk groups.[1] Based on findings of these studies preventive and educative programs can be started targeting high risk population. With this background in mind present study was undertaken to determine epidemiological characteristics, etiology of burns, explore risk factors affecting mortality of burn patients in our region.

METHODS

After obtaining the institutional ethics committee approval, present prospective descriptive study was carried out in department of surgery at a tertiary care teaching hospital at Solapur, Maharashtra. Ours is a rural tertiary care centre surrounded by many villages. Present study was carried out for a period of 3 years (January 2011 to December 2013) on 500 patients.

Inclusion criteria

- All patients, regardless of age & gender, presented with burn injury and requiring admission were included.

Exclusion criteria

- Patients with minor burn injury treated on OPD (outpatient department) basis.
- Patients who had taken discharge against medical advice and those declared absconded.
- Patients not willing to enroll in the study.

On admission detailed history and thorough clinical examination was performed as per prefixed proforma. The data regarding age, sex, residence, socioeconomic status, education, marital status, place of burn injury, time, agent, circumstances of the injury, duration of symptoms, were documented after direct interview with patient or patient's attendants. On admission general condition of patient assessed, TBSA (Total Body Surface Area) burnt depth of burn, associated illness documented. Wallace rule of nine and Lund and Browder chart was used for defining the extent of burn in adults and paediatric patients respectively. Patients were managed according to percentage of burn. Burn wound cleaned with soap and water, blisters and debris were removed. Tetanus prophylaxis was given. Parkland formula (4 ml RL X kg X % TBSA burn) was used for calculation of fluid requirement. Dressing with topical antimicrobials (Silver sulfadiazine, Povidone iodine, Soframycin) done along with care of eyes, mouth and back. Third generation cephalosporins and metronidazole were the commonly used antibiotics. All electric burns, irrespective of percentage were admitted for 72 hours for observation. Laboratory investigations like complete blood count, serum electrolytes, urea, creatinine, random blood sugar were done. Wound swab culture and sensitivity were done whenever required. Blood transfusions were given whenever necessary. After recovery, patients having post-burn contractures were treated by reconstructive surgery and vocational and occupational therapy. The data collected were entered into MS-Excel sheets and analysis was carried out. On the basis of analysis and observation, results were drawn and discussed and compared with other relevant literatures.

RESULTS

The most vulnerable age group noted in this study was 21 to 40 years (74%),whereas least number of victims were seen above 60 years of age (1%).

Out of 500 cases studied, 191 were male and 309 were females. Thus females outnumbered the males with female to male ratio of 1.6:1.

Table 1: Age incidence.

Age group in years	No. of cases	Percentage
1-20	55	11%
21-40	370	74%
41-60	70	14%
>60 years	05	1%

Table 2: Sex incidence.

Sex	No. of cases	Percentage
Male	191	38.2%
Female	309	61.8%
Total	500	100%

Wound infection was the commonest complication noted in this study. *Pseudomonas* and *Klebsiella* was the most common organism causing wound infection.

The overall mortality rate in this study was 56.6%. Mortality was more in females as compared to males.

Highest mortality was observed in patients having total body surface area burnt more than 60%. As the total body surface area burnt increased the mortality also increased. Mortality was 100% in patients having TBSA burnt more than 80%.

Mortality was highest in suicidal burn patients.

Figure 1: Scald burn over right foot.

Table 3: Distribution of patients according to epidemiological variables.

Residence of patients	**No. of cases**		**Percentage**
Rural	330		66%
Urban	170		34%
Marital status	**No. of cases**		**Percentage**
Married	130 (Male)	266 (Female)	92.6%
Unmarried	42 (Male)	62 (Female)	18.4%
Seasonal variation	**No. of cases**		**Percentage**
Summer	135		27%
Rainy season	86		17.2%
Winter	279		55.8%
Place of burn	**No. of cases**		**Percentage**
Home	427		85.4%
Work	54		10.8%
Others	19		3.8%
Method of cooking	**No. of cases**		**Percentage**
Floor cocking	392		78.4%
Elevated cooking	108		21.6%
Type of clothes at the time of burn	**No. of cases**		**Percentage**
Cotton	118		23.6%
Synthetic	248		49.6%
Mixed	134		26.8%
According to literacy	**No. of cases**		**Percentage**
Literate	124 (Male)	87 (Male)	42.2%
Illiterate	105 (Male)	184 (Female)	57.8%
Occupation	**No. of cases**		**Percentage**
House wives or Housemaids	168		33.6%
Labourer	197		39.4%
Businessman	27		5.4%
Job	53		10.6%
Students	41		8.2%
Others	14		2.8%
Socioeconomic status (Modified B.G.Prasad classification)	**No. of cases**		**Percentage**
Upper class	10		2%
Upper middle class	15		3%
Middle class	25		5%
Lower middle class	40		8%
Lower class	410		82%

Table 4: Distribution of patients in relation to clinical variables.

Type of burn	**No. of cases**	**Percentage**
Thermal	421	84.2%
Scalds	38	7%
Electrical	28	5%
Miscellaneous	13	3%
Nature of burn	**No. of cases**	**Percentage**
Accidental	367	73.4%
Suicidal	107	21.4%
Homicidal	26	5.2%
Depth of burn	**No. of cases**	**Percentage**
Superficial	56	11.2%
Deep	194	38.8%
Mixed	250	50%
Burn patients having associated illnesses	**No. of cases**	**Percentage**
Tuberculosis	6	1.2%
Hypertension	11	2.2%
Asthma	4	0.8%
ANC	15	3%
Psychiatric illness	9	1.8%
Epilepsy	3	0.6%
Diabetes	1	1%
Time of occurrence of burn	**No. of cases**	**Percentage**
5 am to 11 am	105	21%
11 am to 5 pm	138	27.6%
5pm to 11pm	209	41.8%
11pm to 5 am	48	9.6%
Total body surface area (TBSA) burnt	**No. of cases**	**Percentage**
10-20	70	14%
21-40	90	18%
41-60	91	18.2%
61-80	70	14%
81-100	179	35.8%

Figure 2: Superficial to deep burn.

Figure 3: Deep burn.

Figure 4: Formation of Escher over the left hand following burn injury.

Table 5: Complications in burn patient.

Complications	No. of cases	Percentage
Wound infection	244	48.8%
Septicaemia	97	19.4%
Urinary tract infect	35	7%
Adult respiratory distress syndrome (ARDS)	14	2.8%
Burn shock	78	15.6%
Multi-organ dysfunction syndrome (MODS)	32	6.4%

Table 6: Mortality in relation to sex.

Sex	Total patients	No. of deaths	Percentage
Male	191	77	15.4%
Females	309	206	41.2%
Total	500	283	56.6%

Table 7: Mortality in relation to TBSA (%) burnt.

Total body surface area burnt (TBSA)	Total patients	No of deaths	Percentage
10-20	70	0	0.00%
21-40	90	6	6.66%
41-60	91	32	35.16%
61-80	70	61	87.14%
81-100	179	179	100%

Table 8: Mortality in relation to nature of burn injury.

Nature of burn injury	Total patients	No. of deaths	Percentage
Accidental	374	182	48.6%
Suicidal	101	82	81.18%
Homicidal	25	19	76%

DISCUSSION

The epidemiology of burns varies from one part of the world to another as it depends on the level of civilization, industrialization, and culture among other things.[2] Because of diverse culture and societies of our country, epidemiological studies are required for identification of population at risk, etiology of burns, and problems involved in the management of burns. From theses epidemiological studies preventive measures can be started against a particular population at risk for sustaining burns.

In the present study highest incidence of burns was seen in age group between 21 and 40 years. Similar findings have been observed in studies reported by Akther JM et al. and Deshpande JD et al.[3,4] High incidence of burns in this age group may be because this age group is generally more active age group and more commonly exposed to hazards both at work and at home. This age group also included newly married females who became victims of bride burning. In newly married females physical and psychological stress of marriage, harassment by parents-in-law or dowry harassment were observed. In married males, unemployment and depression were the common causes.

Females were more commonly involved in burn injury than males in our study with female to male ratio of 1.6:1. Similar observations indicating female predominance were reported by various other studies.[2-7] Female predominance may be because in our country cooking is considered as the primary responsibility of females so they are more commonly exposed to fire than males. Indian females wear loose fitting clothes like Sari, dupatta which can catch fire easily. The gender discrepancy may also be due to early marriages of females in family which exposes them to social and family stress and marital disharmony. In the study

conducted by Gupta AK et al in Punjab males were more commonly affected than females which are in contrast with our study. Various international studies showed male predominance which is also in contrast with our studies.[8,9-13]

Most of the burn victims (66%) in our study were from rural area and this finding is in accordance with the various other studies.[2,3,6] This could be attributed to low standard of living in rural people and related factors. Majority of burn patients in this study were from low socioeconomic status as per modified BG Prasad classification.[14] This findings was comparable with studies conducted by Singh D et al. and Singh MV et al.[15-16] In this study most of the patients (57.8%) were illiterate and illiteracy was higher in females than in males. These findings are in accordance with the studies conducted by Singh MV et al. and Attia AF et al.[16-17] This clearly indicates that educational level has definite impact on the incidence of burn.

Majority of burns occurred between 5 pm to 11 pm in this study. These findings are comparable with the study conducted by Singh MV et al.[16] The probable reason for this is that this period coincides with the time of preparation of meals at home. In this study majority of patients had synthetic clothes at the time of burn. Similar finding was also noted in the study conducted by Mago V et al.[18] Synthetic clothes catch fire easily and flare upward resulting in difficulty for the victim to save oneself from the burn injury.

Most of the victims in the present study were labourers followed by housewives. Similar observations have been made in the study conducted by Darshan BB et al.[7] Majority of patients sustained burns at homes in this study. This is in accordance with the various other national studies.[3,4] and international studies.[20-21]

Flame was the commonest cause of burn noted in our study. Similar findings were reported in various other studies conducted in developing countries.[3,4] High incidence of flame burn was explained by the fact that in villages kerosene stove, kerosene lamps, Chullha, Shegadi are commonly used for cooking. Kerosene is commonly used in rural area as domestic fuel as it is cheap and easily accessible. As far as nature of burn is concerned majority of burns 73.4% were accidental. This finding is in accordance with other studies.[3,4] Least common nature of burn is homicidal. Homicidal burns are also common in newly married female but in many cases the actual nature of burn is not disclosed by the patient either due to pressure or emotional blackmailing by in-laws or relatives.

Incidence of burn was highest in winter season in our study. This was probably related to the use of shekoti by the people in rural area for warmth and also use of crackers during the Diwali festival in winter in our region. This finding was in contrast with the study conducted by Burton KR et al at Canada where burn injuries were low in winter.[22] In present study 9.8% patients had associated illness, of which ante natal cases (3%) and hypertension 2.2% were the commonest. In the studies conducted by Gallal et al and Bilwani PK et al, diabetes mellitus and psychological disorder were the commonest associated illness noted in burn patients respectively.[23-24]

The overall mortality rate in our study was 56.6%. This figure is comparable with the various other studies.[5,26-24] Septicaemia was the main reason for mortality. As compared with the study by Puri V et al the mortality rate is low in our study.[27] As compared to Sarma BP et al and Gupta M et al studies, mortality rate was high in our study and this could be because majority of patients having burn involving total body surface area more than 60%.[28-29] Mortality increases as total body surface area increases. The mortality rate is more in females and this may be because of female sex discrimination, families usually don't want to spend money on the treatment of female patient.

CONCLUSION

Burn injuries are common in India, majority are accidental and occurs at home and are preventable. Higher mortality is found to be associated with female sex, suicides, and flame burns. Despite many advances in medical science, management of burn remains a challenging task in developing countries due to lack of infrastructure, trained persons and cost of treatment. So stress must be given for preventive measures for burns by mass education of people.

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