

## Socio-clinical profile of burn patients: An experience from a tertiary care center in West Bengal

Sinjita Dutta<sup>1\*</sup>, Abhishek De<sup>2</sup>, Sita Chattopadhyay<sup>3</sup>, Mausumi Basu<sup>4</sup>, Raghunath Misra<sup>5</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Demonstrator, <sup>3,4</sup>Associate Professor, <sup>5</sup>Professor & HOD, Dept. of Community Medicine, IPGME & R, Kolkata, West Bengal

**\*Corresponding Author:**

Email: sinjita@gmail.com

### Abstract

**Introduction:** Burns are one of the leading causes of disability adjusted life years lost in low and middle income countries. The risk factors include gender, age, socio-economic conditions, occupational exposure, chronic disease, alcohol and smoking abuse, use of kerosene as fuel etc.

**Materials and Method:** A descriptive observational study with cross sectional study design was conducted among burn patients admitted in burn units of IPGME&R, Sambhunath Pandit Hospital and M. R. Bangur Hospital of Kolkata during 2016.

**Result:** It was seen that burn injuries were more prevalent in the age group "0-10" years (30%), females (60%), Hindus (78%) and people residing in rural areas (52.6%). More than 60% of the burn incidents had occurred either during morning or afternoon and the mostly in the kitchen (60.3%). Almost 95% of the cases were due to accidents. Bursting of kerosene stove (31%) emerged as the most prevalent cause of burn accidents. Anatomically Superior (65%) and inferior (67.9%) extremities were the most affected areas. The mean ( $\pm$ SD) TBSA affected by burn was 33.63 (13.43). On regression it was found that the total body surface area affected by burn was significantly associated with residence, marital status and socio-economic status of the study population.

**Conclusion:** Health and safety education need to be dispersed among people. Low cost safer alternatives should be developed and LPG use should be encouraged.

**Keywords:** Thermal burn, Kitchen, Accident, Kerosene stove, TBSA

### Introduction

A burn is an injury which is caused primarily by heat or due to electricity, friction or contact with chemicals to the external or internal surface of the body, which causes destruction of tissue. The minimum temperature for producing burn is 44° C for an exposure of 5-6 hours. At 65° C 2 seconds are sufficient to produce burns.<sup>(1)</sup> Thermal burns or burns due to heat occur due to damage to tissues by either hot liquid (scalds), contact with hot surfaces or flames.

The risk factors for burn include gender, age, socio-economic conditions, occupational exposure, chronic disease, alcohol and smoking abuse, use of kerosene as fuel etc. High rates of burn injury are due to faulty kitchen appliances and loose fitting clothing typical in India. It is estimated that 1/3rd of all burns in India are due to clothes catching fire from open flames.<sup>(2)</sup> Intentional burns are also a common cause and occur at higher rates in young women, secondary to domestic violence and self harm.<sup>(3,4)</sup> Exact figures can be even higher owing to poverty, illiteracy and poor socio-economic conditions.

Burns are a global public health problem. An estimated 2, 65,000 deaths every year are caused by burn injuries. Non fatal burn injuries are a leading cause of not only mortality but also morbidity. The effect of burn injury can leave permanent scars not only physically but also psychologically.

Burns are amongst the leading causes of disability adjusted life years lost in low and middle income

countries. Women in South East Asian regions have the highest rate of burns accounting for 27% of global burn deaths and nearly 70% of fatalities in the region. Around 4 out of 5 burn cases are women and children. Burns are the 11th leading cause of death of children aged between 1 to 9 years.<sup>(5)</sup>

WHO estimates that in India over 10 lakh people are moderately or severely burnt annually. In India alone, around 7 million people suffer from burn injuries, out of which, 7 lakh need hospital admission and 2.4 lakh become disabled. As per the data extrapolated from the information received from 3 major Govt. Hospitals in Delhi, approx. 1.4 lakh people die of burn injuries annually. Around 70% of all burn injuries occur in the most productive age group, 15-35 years.<sup>(6)</sup>

Epidemiological studies have an important role in recognition of risk factors and high risk groups. Also in order to be able to plan and evaluate any public health problem such as, burn injury, continued surveillance is essential. The management of burns remains a challenge in developing countries and few data exist to document the extent of the problem.

This study aimed at providing data in this regard by documenting the epidemiology of burn injuries and analyzing the same with a view to help in further planning of strategies for prevention of burns.

## Materials and Method

A descriptive observational study with cross sectional study design was conducted among burn patients admitted in burn units of IPGME&R, Sambhunath Pandit Hospital and M. R. Bangur Hospital of Kolkata during 2016 for a period of one month. The burn units of both Sambhunath Pandit and M.R. Bangur Hospital were under administrative control of IPGME&R and faculty from IPGME&R regularly visited these hospitals. Complete enumeration of all the patients admitted in burn units of the above mentioned hospitals during the study period was done. Patients who gave informed consent were considered for the study. In the case of individuals below 18 years, consents from their guardian/parents were obtained. In the case of seriously ill patients, informed consent was obtained from their primary care givers. Permission was also obtained from Institutional Ethics Committee.

A total of 156 patients were thus obtained as final sample size.

The study tools included predesigned, pretested structured schedule and available hospital records. The technique of data collection was interview of patients (or care giver in case the patient was unable to respond) and review of hospital records.

The study variables included socio-demographic factors like age, sex, residence, religion, education, marital status, occupation and socio-economic status.

Regarding residence persons living in an area under a municipality was considered to be urban whereas those living in areas under a panchayat were considered to be rural.

Anyone above 7 years of age, who cannot read and write with understanding in any one of the approved languages, was considered as illiterate. A person who had completed class 4, class 8, class 10 and class 12 was considered as having primary, high school, secondary and higher secondary education. Graduate included Bachelors degree in any discipline.

Per Capita Monthly Income (PCMI) was calculated based on monthly Income of the family and number of family members. Socio-economic status was ascertained based PCMI clusters according to the "Revised modified B.G. Prasad socioeconomic classification scale, January 2014."

The different types of burn injury were classified as Thermal burns caused by fire, steam, hot objects, or hot liquids; Electrical burns are caused by contact with electrical sources or by lightning; Chemical burns are caused by strong acid or alkali substances.

The different types of thermal burns included Flame: exposure to prolonged, intense heat. House fires, improper use of inflammable liquids, ignited clothing from stoves, all these fall under this category. Flash: Explosion of natural gas or other inflammable liquids. This causes intense heat for very brief period of time. Clothing is protective unless it ignites.

Scald: Burns caused by hot liquids including water, oil, grease etc.

Contact: Results from contact with Hot metal, plastics, glass or coal.

Total body surface area (TBSA) is an assessment of injury, such as burns. In adults, the Wallace rule of 9 was used to determine the total percentage of area burned for each major section of the body. Persons with <15% of TBSA involved were classified as mild, 15-25% as moderate and >25% as severe burn.

Data obtained was analyzed using SPSS v 23 and MS Excel.

## Results

Table 1 describes the socio demographic profile of the study population. It was seen that burn injuries were more prevalent (30%) in the age group "0-10" years. Out of the total study population, 60% was females, 78% were Hindus, and more than half (52.6%) came from rural areas. Nearly 60% of the study population were either illiterate or had completed education up to primary school level only. Over 95% of the population affected by burn injuries was married and nearly 30% were housewives. More than half of the burn victims belonged to lower middle class.

It is evident from table 2 that more than 60% of the burn incidents had occurred either during morning or afternoon and the mostly in the kitchen (60.3%). Almost 95% of the cases were of accidental in nature and homicide and suicide accounted for a meager 3.8% and 1.3% respectively. Bursting of kerosene stove (31%) in the kitchen emerged as the most prevalent cause of burn accidents.

Thermal type of burn was the most common (89.7%) while chemical burns (1.3%) was a rarity. (Fig. 1)

The most common type of thermal burns was due to flames (51.3%), followed by flash (21.8%) and scalds (14.1%) type. Contact burns were least prevalent (2.6%). It was found that nearly 75% of the victims were wearing cotton clothes at the time of injury.(Fig. 2)

Anatomically Superior (65%) and inferior (67.9%) extremities were the most affected areas, whereas injury in the head was the least (6.4%).

Table 3 shows severity in terms of total body surface area (TBSA). It was found that nearly three fourth of the victims had severe burn (i.e. >25% of TBSA involved), followed by moderate burn (19.2%). The mean ( $\pm$ SD) TBSA affected by burn was 33.63 (13.43) with a range of 5 to 65%.

In spite of first AID being of utmost importance, nearly 27% of the burn victims were deprived of it. However 83.3% of the victims sought first professional medical help within 2 hours of the incident and the remaining within 12 hours.

On regression it was found that the total body surface area affected by burn was significantly

associated with residence, marital status and socio-economic status of the study population (Table 4).

**Table 1: Distribution of the study population according to their Sociodemographic profile**

Age group (in years) (N=156)	Number	Percentage
0-10	48	30.8
10-20	14	9.0%
20-30	40	25.6%
30-40	22	14.1%
40-50	20	12.8%
>50	12	7.7%
Residence(N=156)	Number	Percentage
Urban	74	47.4
Rural	82	52.6
Sex (N=156)	Number	Percentage
Male	62	39.7
Female	94	60.3
Religion(N=156)	Number	Percentage
Hindu	122	78.2
Muslim	34	21.8
Literacy (N=138)	Number	Percentage
Illiterate	20	14.49
Non formal education	10	7.25
Primary Education	54	39.13
Secondary Education	28	20.29
Higher Secondary Education	16	11.59
Graduation and above	10	7.25
Marital Status(N=104)	Number	Percentage
Married	96	61.5
Unmarried	8	5.1
Occupation (N=134)	Number	Percentage
House Wife	48	30.8

Labourer	18	11.5
Business	12	7.7
Service	24	15.4
Student	16	10.3
Unemployed	16	10.3
SES (N=156)	Number	Percentage
Upper class	6	3.8
Upper middle	12	7.7
Middle	20	12.8
Lower middle	80	51.3
Lower	38	24.4

**Table 2: Distribution of study population according to the time and place of incident (N=156)**

Time of the incident	Frequency	Percent
Morning (5AM-12Noon)	48	30.8
Afternoon (12Noon-4PM)	46	29.5
Evening (4PM-9PM)	36	23.1
Night (9PM-5AM)	26	16.7
Place of incidence	Frequency	Percent
Kitchen	94	60.3
Puja Room	8	5.1
Workplace	14	9.0
Others	40	25.6

**Table 3: Distribution of study population according to severity of burn (N=156)**

Severity of burn	Number	Percent
mild	10	6.4
moderate	30	19.2
severe	116	74.4
Total	156	100.0

**Table 4: Relationship of total body surface area affected in relation with socio-demographic variables**

Relationship of total body surface area affected in relation with socio-demographic variables					
Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	17.376	16.040		1.083	.282
Sex	5.467	2.959	.205	1.848	.068
Age	.041	.112	.041	.364	.716
Religion	.873	3.310	.028	.264	.792
Residence	5.091	2.538	.199	2.006	<b>.048</b>
Literacy	-1.182	.961	-.137	-1.229	.222
Marital Status	17.361	5.757	.321	3.016	<b>.003</b>
Type of Burn	-3.411	2.751	-.147	-1.240	.218
Clothing	3.021	3.215	.103	.940	.350
Time between injury and first professional medical help	-.624	3.135	-.020	-.199	.843
Place of incidence	-2.264	1.313	-.228	-1.724	.088
Time of the incident	-1.945	1.268	-.166	-1.534	.129

First AID	3.099	2.788	.111	1.111	.269
Socio Economic Status	-2.661	1.145	-.239	-2.324	<b>.022</b>
a. Dependent Variable: % Total Body Surface Area affected					

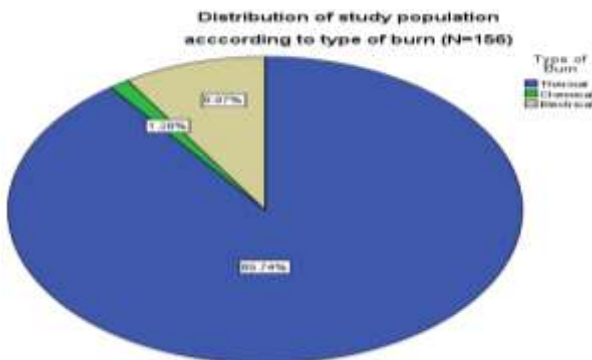


Fig. 1

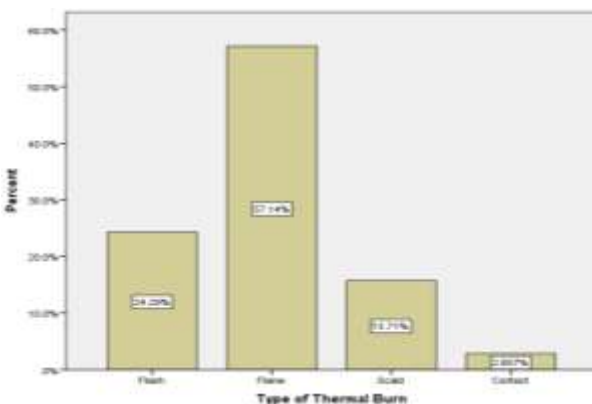


Fig. 2: Distribution of study population according to type of thermal burns (N=)

**Discussions**

In our study the percentage of younger burn victims (0-10 years) were higher (nearly 31%) when compared to that found in a study by Goodarzi et al from (about 23%) in Iran.<sup>(7)</sup> The mean age of burn victims in our study was 24.6 and standard deviation ±17.79, ranging from 1 year to a maximum of 65 years. The mean age of the burn victims is close to that reported from a study by Mir et al from Kashmir which was 21.91. In our study nearly 40% of the victims were in age group of 20-40 years which was lower in comparison to nearly 56% as reported in a study by Jagganath et al from Solapur<sup>(8)</sup> and Shankar et al from Karnataka<sup>(9)</sup> (54.58%).

Rural victims (52.6%) were significantly more than urban victims (47.4%) in our study. This was similar to the study from Solapur<sup>(8)</sup> where rural victims (52.4%) had outnumbered urban victims (47.56%)

The present study shows a predominance of burns in females (60.3%) over males (39.7%). Again homemakers (30.8%) were the most affected group according to occupation. This was due to the greater engagement of women in kitchen work as the most common place of incident was reported to be kitchen (60.3%). This

finding is corroborated by the study from Iran by Goodarzi et al.<sup>(7)</sup> However a study from Ghana by Agbenorku et al revealed male predominance among burn victims.<sup>(10)</sup>

In our study the most of the burn injuries occurred as accidents (95%). In the study by Gupta et al from Punjab<sup>11</sup> 87% of burn injuries were of accidental nature and 52% of the burn cases occurred in kitchen. In our study bursting of kerosene stove emerged as the most common cause (31%) of burn injuries. This exposes the vulnerability of women in Indian households where they have to work under unsafe conditions.

Since West Bengal is mainly populated by Hindus, it was obvious to see more burn cases among this community.

In our study nearly 21.74% of the burn victims were either illiterate or did not receive any formal education. This is similar to the findings of a study by Chakraborty et al from Kolkata.<sup>(12)</sup> However the study by Jagannath et al from Solapur<sup>(8)</sup> found as high as 60% of the burn victims to be illiterate.

In the present study nearly 76% of the victims belonged to either lower or lower middle class. The Total body surface area affected by burn was found to be significantly associated with the socio-economic status of the burn victims. This is similar to the findings of the Solapur study.<sup>(8)</sup>

Flame burns (51.35%) were the commonest type of burn in this study. This is similar to many studies from India,<sup>(13,14,9)</sup> and abroad.<sup>(15)</sup>

Regarding the anatomical site of injury upper and lower limbs were most commonly affected and head and face the least. This is corroborated by a study from Iran by Goodarzi et al.<sup>(7)</sup> Another study by Jaiswal et al from Indore reported thorax and abdomen to be the most common anatomical site affected (67.9%) which was 71% in the present study.<sup>(16)</sup>

In a study by Gupta et al from Punjab,<sup>(11)</sup> 9% patients sustained <15% TBSA whereas in our study it was 6.4%. In our study majority (74.4%) of the burn victims had >25% of total body surface area affected by burn.

The mean (±SD) TBSA affected by burn was 33.63 (13.43) with a range of 5 to 65% in the present study. This was similar to the mean TBSA reported from an Iranian study (31%) and an African study (35.07%) by Agbenorku et al.<sup>(10)</sup> However it was slightly lower than the mean TBSA reported by a study by Deshpande et al (46.5%) in a study from Loni, Maharashtra<sup>(17)</sup> and Gupta et al from Punjab<sup>(11)</sup> (mean TBSA of burns was 48%, SD±18.2).

In our study the TBSA affected was significantly associated with marital status, socio-economic status and residence. Thus married women from poor socio-

economic backgrounds coming from rural areas were more likely to get involved in accidental burns as they were exposed to unsafe kitchen and cooking conditions their homes. This finding is corroborated by many Indian and foreign studies.<sup>(7,8,16,17,18)</sup>

### **Conclusion and Recommendation**

From this study we can conclude that:

- Pediatric age group (0-10) was the most affected.
- Thermal burns accounted for the maximum number of incidences.
- Kerosene stove burst was the most prevalent modality

The study revealed that women working in unsafe kitchens with open, unguarded flames at lower levels. (Chullha, stove, etc.) were the main victims of accidental burn injury. This was because in India cooking remains the primary responsibility of the females. Most of them came from rural and poor socio-economic background. The use of kerosene stoves seemed to cause the maximum number of accidents. This can be minimized by using flame retardant kitchen aprons and avoiding cooking at lower levels. Thus low cost safer alternatives should be developed and LPG use should be encouraged among these communities.

30.8% of burn incidences were reported in the "0-10" year age group. This falls in place with the recent trend of raised incidences of pediatric burns. Proper precautions must therefore be taken while cooking or doing any activity near the fire and adult supervision is necessary for children, at all times.

Again health and safety education need to be dispersed among people. Basic measures of first aid and fire safety should be added not only to school curriculum but also taught and demonstrated by Anganwadi workers or ASHAs at the village level.

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