

Clinical study of burn patients requiring admission: A single center experience at North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences

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ABSTRACT

Background: Although burns are a major problem in health care, a lot of the variation in risk factors exists from region to region which if uncovered correctly could help take effective prevention measures. **Aims and Objectives:** To assess the 3-year (January 2012 to January 2015) epidemiology of burn injuries admitted to our hospital (primary objective) and to find areas of improvement in burn care (secondary objective). **Materials and Methods:** After obtaining ethical approval data were obtained from the medical record section regarding age, sex, residence, occupation, marital status, socioeconomic status, dates of admission and discharge, circumstances regarding the place, intent, cause, and source of heat. Clinical assessment was done using Wallace's "Rule of Nine" in adult and "Lund and Browder" chart in the pediatric age groups. The interrelationships between clinical and epidemiological variables with burn injury were studied. **Results:** An increasing trend in the admission rates of burn victims noted in last 3 years males (55.47%) outnumbered females (44.52%). The most common age group affected is older children, adolescents, and young adults (between 11 and 30 years). Flame (38.3%) and scald (25.3%) burns contributed to most of the injuries. Females (52.30%) are the major victim of flame burns. Electrical and chemical burns affected only the males suggesting work-related injuries. Trunk (30.8%) is the most severely affected site in all cases. Depression (6.8%) and power line workers (4.7%) seem to be important risk factors in our study. Inability to complete treatment (26.7%) was a major concern in our study. **Conclusions:** This study highlights the need for proper burn care that could be provided at the primary health-care level. The majority of burns were accidental in nature in school going children, young adults, and females. Flame and scald burns were the most common cause. Preventive measures directed toward burn safety and first aid measures may improve the outcome in burn injuries.

Keywords: Burn, epidemiology, prevention, risk factors

Introduction

Burn injuries which are a well-known health problem since ages continue to increase in incidence in spite of improved healthcare

facilities and awareness among the masses. It is estimated that 1% of the world population will suffer from a serious burn injury sometime in their life.^[1,2]

The etiological factors of burns vary in different countries and within various regions of the same country. India with such diverse cultural and climatic conditions has varied epidemiological

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factors leading to burn injuries. Consequently planning and implementing preventive programs can be made more successful if data can be accumulated from most parts of the country. The paucity of data from North-eastern India prompted us to undertake this study about the various epidemiological factors prevailing in the region.

Materials and Methods

After obtaining Institutional Ethics Committee approval, this retrospective study was carried out on a total of 146 burn patients admitted between January 1, 2012, and January 1, 2015. Patients treated on outpatient department basis were excluded from the study. Data were obtained from the medical record section, (including telephonic and personal communication) regarding (i) age, sex, residence, education, occupation, marital status, socioeconomic status (SES) of the patients, (ii) circumstances leading to the injury: place, time, agent, and (iii) chronological data: date of admission and discharge.

Clinical assessment was done in the form of general assessment of the patients, total body surface area (TBSA), degree/depth of burns and any associated illness. Depth of burns was divided into first, second, and third-degree burns. For defining the extent of burns, Wallace’s rule was used in adult and Lund and Browder chart was used in children. SES was calculated using the Kuppuswamy’s SES scale online tool. Routine hemogram, serum electrolytes, urea, creatinine, random blood sugar, urine albumin, urine sugar, wound swab culture, and sensitivity were done on admission and whenever felt necessary. The inter-relationship between clinical variables and epidemiological variables with burn injury were studied. This was a descriptive study, so no test for significance was applied. On the basis of the observations and analysis, results were drawn and compared with other relevant literature.

Results

The rates of hospital admission in 2012 were 25.34% whereas in 2014 it was 41.78% [Table 1], thereby showing an increasing trend in the rates of admission of burn patients. Moreover, the burn cases handled at the primary care level has also increased from 24.32% to 34.24%. There was male predominance in the number of burn patients [Figure 1]. Majority (43%) of the patients were males between 11 and 30 years of age [Table 2 and Figure 2] followed by preschool children (<6 years age). About 69.86% of patients (*n* = 102) belonged to low socioeconomic group [Table 3] and 69% were from rural background [Figure 3].

The ethnic group mostly affected were persons belonging to the Khasi community (38%) followed by persons belonging to the Jaintia and Bengali communities, respectively [Figure 4]. Flame (38.35%) and scald (25.34%) burns were the most common cause whereas electrical burns (6.16%) were the least common cause [Table 4]. The flame burn was more common in females (52%) due to the use of firewood and coal for cooking and wearing of synthetic apparels during cooking [Table 5]. About 28.7% patients had burn injuries involving 10–20% of TBSA and very few cases (2.1%) had burns involving more than 70% TBSA [Table 6]. Trunk (30.8%) was most common body part involved [Table 7], followed by upper limbs (27.4%) and lower limbs (26.7%). Facial burn (including head and neck) was the least common (6.8%) as few cases were associated with suicidal or homicidal injuries.

Majority of the patients (57%) suffered burn from nonwork-related activities. Few cases burns due to suspected assault (6%) and child abuse (4%) were noted [Table 8]. Depression (6.8%) was the most commonly associated risk factor [Table 9], followed by workers engaged in the power line (4.7%), drug abusers (2.7%), and epileptics (2.1%). Most of the burns occurred in house (61.6%) followed by streets (22%) and workplaces [Table 10]. Third-degree burns (52.73%) were the most frequently encountered injuries [Table 11]. A good proportion of patients (26.7%) could not complete treatment [Table 12] due to financial constraints (17.1%) and lack of family support (4.1%). Eleven patients died during their course of treatment in the hospital (7.5%), who were associated with severe burn injuries or inhalational injuries.

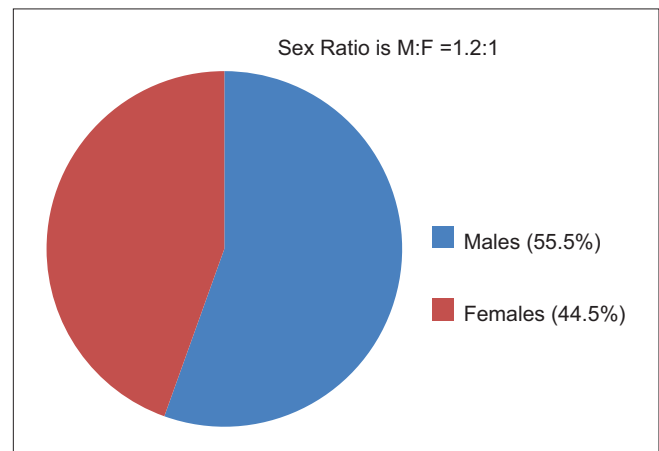


Figure 1: The number of males (*n* = 81) and females (*n* = 65) injured in percentage

Table 1: Rates of hospital admission during the various periods

Period	Males (%)	Females (%)	Total number of patients (%)	Primary admission (percentage of cases in the same year)	Referred from PHC/CHC (percentage of cases in the same year)
January 1, 2012-2013	22 (27.16)	15 (23.08)	37 (25.34)	28 (75.67)	9 (24.32)
January 1, 2013-2014	26 (32.10)	22 (33.84)	48 (32.88)	31 (64.58)	17 (35.41)
January 1, 2014-2015	33 (40.74)	28 (43.08)	61 (41.78)	37 (60.65)	24 (39.34)
Total	81 (55.48)	65 (44.52)	146 (100.00)	96 (65.75)	50 (34.24)

PHC: Primary Health Centre; CHC: Community Health Centre

Discussion

Worldwide, approximately 2 lakh people die each year from burn injuries.^[3] In developing countries, these injuries are one of the major cause of concerns for public health with South-eastern Asia accounting for the highest burn injury related mortality rates.^[3,4]

With India’s recent socioeconomic growth, health care has improved, but the management of burn patients and their prognosis still remains poor probably due to the lack of trained professionals and specialized burn centers.^[5] Contributing to this is the high cost related to burn injuries which is unaffordable to most patients^[5,6] as was evident in our study where 26.7% of patients could not complete their treatment due to financial constraints.

Age group of 11–30 years was most commonly affected similar to many other studies.^[7-13]

Flame burns followed by scalds were the most common causes of burn injuries seen in our patients similar to many other studies from India^[14] and abroad.^[13] This high incidence may be attributed to the frequent use of hot liquids and fireplaces to combat the

cold and windy weather prevalent in this hilly region. Unlike other studies^[15] chemical burns in this region were seen mostly in males and was accidental in nature.

Seasonal variation in burn injuries are another potential area of importance and have been reported from different regions in India like Western (Ahmedabad)^[16] and Central India (Nagpur).^[17] Very high temperature and low humidity during the summer in these regions are responsible for burn injuries.

However, people living in this region use “open wood fire” and “Gorsy” (burning coal on an earthen container) as a source of heat in winter months, increasing the incidence of accidental burn injuries. There is also a surge in the number of burn injuries during the windy months of March to May.

The incidence of burns is also more during Diwali festival as seen in some studies.^[18]

Another factor contributing to burns in this region may be a lack of a separate kitchen area and people usually cook inside or beside their living room/cottage. Similar findings were also noted in many studies from India^[14,19] and other low-income countries such as Egypt^[20] and Pakistan.^[21]

Age groups (years)	Males, n (%)	Females, n (%)	Number of patients, n (%)
<6	17 (20.9)	12 (18.4)	29 (19.8)
6-10	4 (4.9)	6 (9.2)	10 (6.8)
11-20	20 (24.6)	14 (21.5)	34 (23.2)
21-30	23 (28.3)	21 (32.3)	44 (30.1)
31-40	9 (11.1)	7 (10.7)	16 (10.9)
41-50	4 (4.9)	1 (1.5)	5 (3.4)
51-60	1 (1.2)	2 (3.0)	3 (2.0)
>60	3 (3.7)	2 (3.0)	5 (3.4)
Total	81 (100.0)	65 (100.0)	146 (100.0)

Socioeconomic status	Males (%)	Females (%)	Total (%)
Upper	7 (8.64)	4 (6.15)	11 (7.53)
Middle	21 (25.92)	12 (18.46)	33 (22.60)
Lower	53 (65.43)	49 (75.38)	102 (69.86)
Total	81 (55.47)	65 (44.52)	146 (100.00)

Age groups (years)	Flame, n (%)	Scalds, n (%)	Hot object, n (%)	Electrical, n (%)	Chemical, n (%)	Unspecified, n (%)	Number of patients, n (%)
<6	11 (37.9)	14 (48.2)	3 (10.3)	0	1 (3.4)	0	29 (19.8)
6-10	5 (50.0)	3 (30.0)	2 (20.0)	0	0	0	10 (6.8)
11-20	22 (64.7)	5 (14.7)	3 (8.8)	0	0	4 (11.7)	34 (23.2)
21-30	9 (20.4)	15 (34.0)	3 (6.8)	1 (2.2)	5 (11.3)	11 (25.0)	44 (30.1)
31-40	8 (50.0)	0	1 (6.2)	4 (25.0)	3 (18.7)	0	16 (10.9)
41-50	1 (20.0)	0	1 (20.0)	3 (60.0)	0	0	5 (3.4)
51-60	0	0	0	1 (33.3)	0	2 (66.7)	3 (2.0)
>60	0	0	0	0	1 (20.0)	4 (80.0)	5 (3.4)
Total	56 (38.3)	37 (25.3)	13 (8.9)	9 (6.1)	10 (6.8)	21 (14.4)	146 (100.0)

Conclusions

Since burn injuries are a major cause of disease burden in India, studying the epidemiologic factors and identifying potential risk

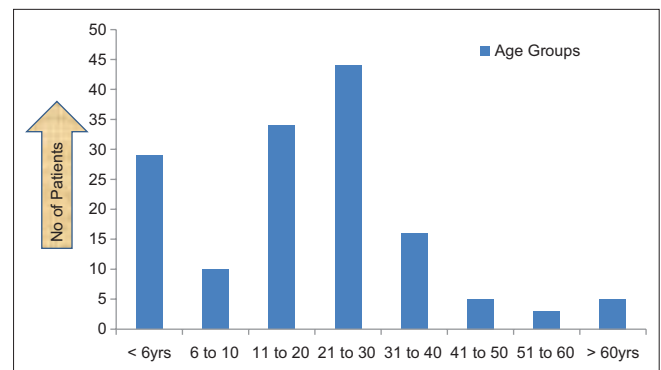


Figure 2: Number of patients in each age group

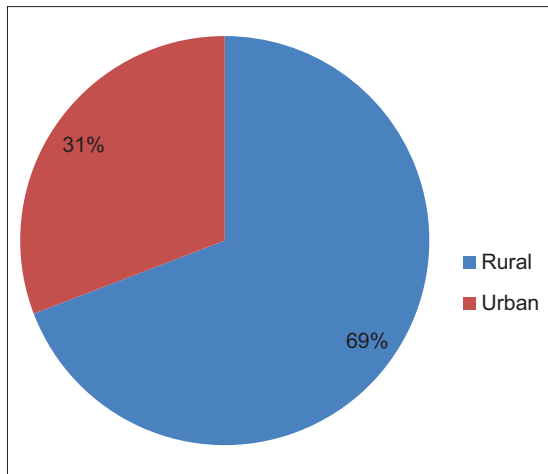


Figure 3: Social background

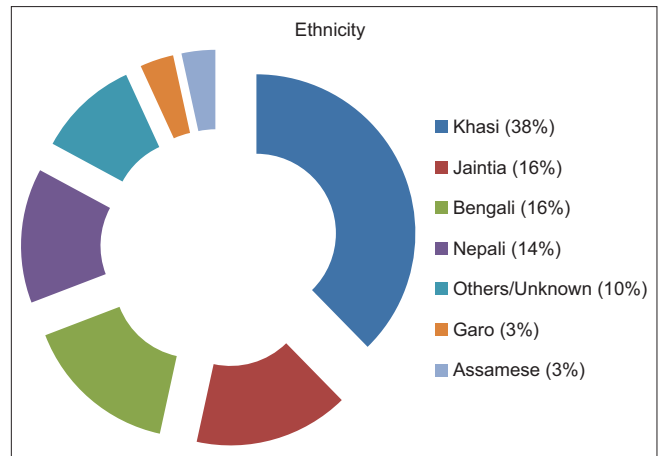


Figure 4: Different ethnicities commonly affected

Table 5: Etiology of burn injuries

Etiology of burn	Males (%)	Females (%)	Number of patients (%)
Flame burn	22 (27.16)	34 (52.30)	56 (38.35)
Scald burn	21 (25.92)	16 (24.61)	37 (25.34)
Hot object	6 (7.40)	7 (10.76)	13 (8.90)
Electrical	9 (11.11)	0 (0)	9 (6.16)
Chemical	10 (12.34)	0 (0)	10 (6.86)
Unspecified	13 (16.04)	8 (12.30)	21 (14.38)

Table 6: Body surface area with number of patients

Percentage of body surface area involved	Number of patients (%)
<10	10 (6.8)
10-20	42 (28.7)
21-30	34 (23.2)
31-40	26 (17.8)
41-50	18 (12.3)
51-60	5 (3.4)
61-70	8 (5.4)
>70	3 (2.1)
Total	146 (100)

Table 7: Most severely affected body site

Most severely affected body site	Number of patients (%)
Trunk	45 (30.8)
Upper limb	40 (27.4)
Lower limb	39 (26.7)
Head and neck	10 (6.8)
Others	12 (8.2)

factors affecting mortality in burn patients may help identify patients at higher risk of death. Burns with higher TBSA, females, and burns with inhalation injuries were associated with higher mortality correlating well with many other studies.^[6,16,22]

There are many limitations of this study. First, the number of patients in this series was limited which is due to the sparse population density of this part of the country. Second, this is a

Table 8: Circumstances of injury

Circumstances of injury	Number of patients (%)
Nonwork related accident	83 (57)
Work related accident	15 (10)
Recreational accident	10 (7)
Suspected self-inflicted injury (suicidal)	10 (4)
Suspected assault (homicidal)	6 (7)
Suspected child abuse	4 (3)
Unknown	18 (12)

Table 9: Common identifiable risk factors

Risk factors	Number of patients (%)
Depression	10 (6.8)
Lineman (power line worker)	7 (4.7)
Ill equipped	5 (3.4)
Drugs	4 (2.7)
Epilepsy	3 (2.1)
None	117 (80.1)

Table 10: Place of injury

Place of injury	Number of patients (%)
Home	90 (61.6)
Street	22 (15.1)
Other specified	20 (13.7)
Public building	4 (2.7)
Recreation site	3 (2.1)
Unspecified	7 (4.7)

single center-based study, so burn victims attending other health care facility will be missed. Third, as the North-eastern region have a mixed population with nearly 200 ethnic communities with different lifestyle and habits and also the topography of the various regions vary, so data collected from a single center may not be reflective of the whole region.

A more systematic multicenter study is required to be able to get a more comprehensive data about the region which may be

Table 11: Degree of burns in different sex groups

Degree of burn	Males (%)	Females (%)	Total (%)
Percentage of first	4 (4.93)	2 (3.07)	6 (4.11)
Second	17 (20.98)	11 (16.92)	25 (17.12)
Third	26 (32.09)	20 (30.77)	38 (26.02)
Mixed	34 (41.97)	32 (49.23)	77 (52.73)
Total	81 (55.47)	65 (44.52)	146 (100.00)

Table 12: Different modes of disposition

Modes of disposition of patients from hospital	Number of patients (%)
Discharged home	21 (14.3)
Discharged home (need minimal home care)	25 (17.1)
Unable to complete treatment	39 (26.7)
Financial	25 (17.1)
No attendant	6 (4.1)
Other reasons	8 (5.4)
Rehabilitation	9 (61.6)
Psychiatry inpatient	4 (2.7)
Extended care facility	7 (4.7)
Acute burn facility referral	9 (6.1)
Died	11 (7.5)
Burn >60%=5	
Inhalational injuries=3	
Electrical burn=2	
Homicidal=1	
Left against medical advice	6 (4.1)
Others/unspecified, transfer	15 (10.2)
Total	146 (100.0)

reflective of the whole region, and necessary suggestions may be put forward regarding preventive and therapeutic measures to be adopted in cases of burn injuries.

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Conflicts of interest

There are no conflicts of interest.

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