

Epidemiology of Burn and Factors Influencing Mortality in Burn Patients in India

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ABSTRACT

Background : Burn injuries and their sequelae are important public health problem in developing country. Fire is a boon as well as curse for mankind as it has both served and destroyed mankind since antiquity.

Objective: The present study is designed to analyse the epidemiology and mortality pattern in burn patients; with an objective of identification of various epidemiological determinants of burn injury & mortality and making an effort for prevention of burn injury & minimising mortality by interfering at various levels.

Method: This retrospective study was conducted in patients of burn injury who expired during the period from 1st January 2009 to 31 December 2009 in surgical ward of S. G. M. Hospital associated with S. S. Medical College Rewa.

Result: This study was carried out in 134 patients of burn injury who expired during the study period. Most commonly affected age group was 21 to 30 years. Out of total 81% were Female, Overall Male: Female ratio was 1:4.36. Majority of burn were accidental (91%) in nature and were in rural areas. In victim with TBSA burn > 80%, mortality (Case Fatality Ratio) was 100% for all age group. Overall mortality (CFR) of burn injury was 39.88%.

Key words: Burn injury, Epidemiology, Mortality

INTRODUCTION

Fire was perhaps man's first double edged sword, for throughout history. It has served as well as destroyed mankind. Estimate of incidence of burn injuries in India vary from 10,000 [1] to 2 million annually [2] of which (50,000) are estimated to be fatal [3]. Significant physical and psychological sequelae are associated with non fatal burn with survivors requiring ongoing treatment, rehabilitation and regular surgical intervention [4,5].

Burn injuries leads to multiple short and long term cost to families, communities and to the nation. The obvious sequelae of burn are well known and includes pain, infection, extensive scarring, contracture formation, wound, death as well as psychological trauma [4,6,7] epidemiological studies have an important role in recognition of risk factors and high risk group [8]

Based on the findings of these studies preventive and educative program can be started targeting high risk population. Keeping this background in mind this study was planned with a purpose to know the epidemiological characteristics, etiology of burn, explore the risk factor affecting the mortality so that sound preventive program could be suggested, planned and implemented to reduce the burn injuries

MATERIAL AND METHOD

This is retrospective study conducted in 134 burn patients who were admitted and died, during the period of 1 year from 1st Jan, 2009 to 31st December 2009 in the Department of surgery in S.G.M Hospital Rewa, Madhya Pradesh, a tertiary care centre of India, various epidemiological information such as age, sex, type of burn, hospital stay, total body surface area (TBSA) involved, degree/depth, and cause of death were noted from hospital record.

Table 1: Distribution of patients according to epidemiological variables / Clinical variables

Residence	No. of cases	%
Rural	94	70.15
Urban	40	29.85
Marital Status	Male / Female	

Married	14 / 89	76.84
Unmarried	11 / 20	23.16
Seasonal Variation		
Winter	52	38.80
Rainy	42	31.34
Summer	40	29.85
Occupation		
House wives	63	47.01
Student	27	20.15
Labourer	17	12.68
Farmer	13	9.7
Children	5	3.73
Others	9	6.68
Time of occurrence of burn		
7 AM – 10 AM	30	22.38
11 AM – 2 PM	19	14.17
2 PM – 7 PM	37	27.61
7 PM – 10 PM	30	22.38
10PM- 6 AM	18	13.43
Source of heat		
Chimney	52	38.80
Kerosene Oil	25	18.65
Stove	22	16.41
Chulla	21	15.67
Cooking Gas	8	5.97
Others (Electric/ Candle/ Cooker burst/ Burning wood)	6	4.46
Burn Surface Area (%)		
0-20	1	0.74
21-24	7	5.22
41-60	12	8.95
61-80	26	19.4
81-100	88	65.67

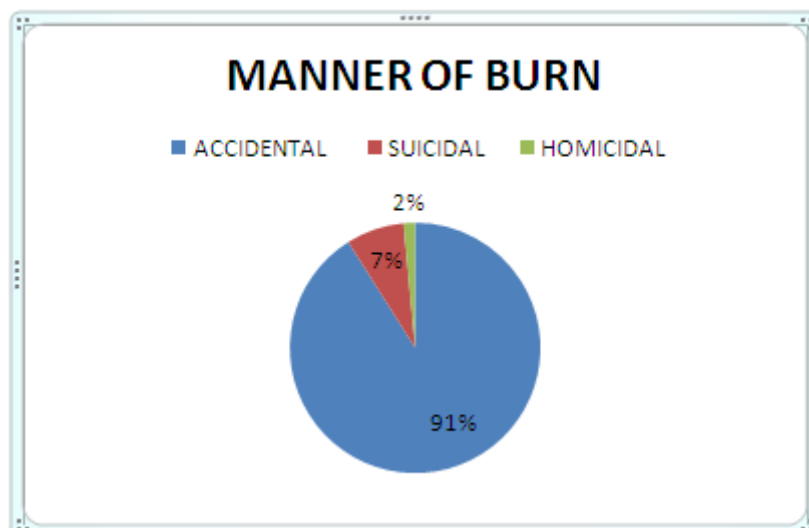


Figure 1: Distribution of Mortality in burn patients according to manner of burn

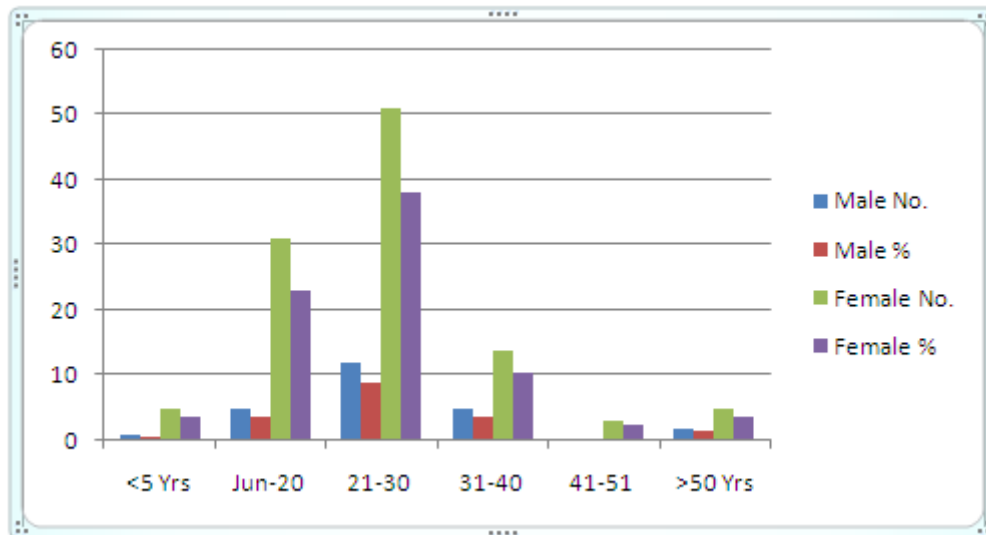


Figure 2: Age & Sex Distribution of burn patients (n=134)



Figure 3: Home Made Chimney



Figure 4 Superficial to Deep Burn

Table 2: Distribution of mortality in relation of body surface burnt and days after admission

S. No	Period Survived Days	Percentage of body of surface Burnt					Total Burn Death	%
		0-10	11-20	21-30	31-40	41-50		
1	<1 or 1	-	4	3	5	51	63	47.0
2.	2-7	1	1	5	5	27	38	28.35
3	8-14	-	-	3	6	6	15	11.19
4	15-30	-	1	1	6	3	11	8.20
5	31-45	-	-	-	4	1	5	3.73
6	46-60	-	2	-	-	-	1	0.73
	Total	01	07	12	26	88	134	
	Percentage	0.74	5.22	8.95	19.4	65.67	100.0	

Table 3: Distribution of cases according to body burn surface area with age

BSA (%)	AGE (In Years)					Total Death	Percentage
	0-20	21-40	41-60	61-80	81-100		
0-20	1	-	-	-	-	1	0.74
21-40	2	1	2	2	-	7	5.22
41-60	2	6	2	2	-	12	8.95
61-80	-	18	5	2	1	26	19.4
81-100	5	69	9	4	1	88	65.67
Total	10	94	18	10	02	134	100.0
%	7.46	70.14	13.43	7.4	1.4	100.0	

RESULT

Out of total admission 336 (5.12%) patient were admitted with history of burn, incidence of burn patient in surgical ward was 51.24 per thousand per year. Out of total 336 burn patient 134 (39.88%) victims expired. Case fatality rate of burn injury was 39.88%.

Age

The highest incidence of burn was in the young adults, maximum 63 (47.01%) in 21-30 years age group out of which (80.95%) were female patient and (19.05%) were male patients. Second most common age group was 6-20 years - 36 (26.81%) patients. Patient below 10 years and above 50 years of age were minimal (Figure 2).

Sex

The incidence of burn injury was more in female than male. One hundred nine cases were female and twenty five cases were male (Figure 2) with ratio of 1: 4.36

Place

Most of cases were from rural area (70.15%) while (29.85%) belongs to urban areas (Table 1)

Occupational Distribution

Maximum victims (47.01%) were house wives. Second most commonly affected patient were students (20.15%) followed by labours (12.68%) and farmers (9.7%). (Table 1)

Source of Heat And Mode Of Injury

Most of cases were domestic burn. Most common source of burn was chimney i.e. (38.80%) followed by kerosene oil (18.65%), stoves 16.41%, chullaha (15.67%) and cylinder (5.97%)(Table 1).

Incidence Resulting In Burn

In present study majority of burn (90.00%) were of accidental type followed by Suicidal burn (7.46%) and homicidal burn (1.49%). (Figure 1)

Body Surface Area Burnt

88 (65.67%) death occurred in patient having 80% - 100% burn followed by 26 (19%) death in patient having 60-79% burn. Majority of cases (85.06%) death occurred in patient having more than (60%) of burn (Table 2).

According To Bsa With Age

Ninety four (70.14%) deaths occurred in patient having 81% - 100% BSA with 15-30 years age group followed by 18 (13.43%) death in patient having 81% - 100% burn surface area with age group 31-45 years (Table 3).

Marital Status

Majority (66.4%) were married female, followed by unmarried females and married males (14.92 and 10.44% cases) respectively (Table 1).

Hospital Stay

In our study 47.0% patient expired within 1 day while 28.35% survived for 2-7 days. Longest period of survival was 55 days thus majority of patients (75.35%) expired within 1 week (Table 2).

Mortality

A total of 336 with burn injury were admitted in our hospital during study period, of which 134 died. The overall mortality rate of burn injury in present study was 39.88%.

DISCUSSION

In the present study, the highest incidence of burn was seen in age group between 21 to 30 years. Similar finding has been observed in the study reported by Akthar JM et al and Deshpande JD et al [9,10]. This study correlates with our society pattern, where adult in this age group are entrusted with the responsibilities both at home as well as outside as they are considered to be active. This group also included newly married females who became victim of bride burning. Female were more commonly involved in burn injury than males in our study with the male female ratio of 1 : 4.36. Similar observation where female victim outnumber male shown by various other study [11,9,10,12,13,14]. Female predominance were reported because they are commonly responsible for cooking of food. Most of these incidences are associated because of ignorance while cooking and using unsafe fire places, faulty appliances and synthetic sarees which catches fire easily and stuck up in the body. In this age group suicidal and homicidal burn are common due to family disputes and dowry reasons.

Sundarson R 1971, from Singapore reported a higher incidence in male probably due to large number of individual burn. In the study conducted by Gupta AK et al in Punjab, male were more commonly affected than female which are in contrast with our study. Various international studies showed male predominance which is also in contrast with our present study [15, 16, 17,18,19,20].

Occupation is very closely related to the incidence of burn patients in the present study, majority of the patients (47.01%) were house wives. The second most commonly affected patients were students (20.15%) & labours accounting 12.68%. The higher incidence of burn in housewives can be explained owing to the fact that they are mostly exposed to the fire while cooking meal with wearing loose and synthetic garments like Saree. In this study majority of patient sustained burn at home which is in accordance with the various other national [9,10] and international studies [21,22].

Majority of victim 94 (70.15%) in our study were from rural area and this finding is in accordance with various other studies [11,9,13]. Rural population is affected more than urban population this may be attributed to use of unguarded domestic heating appliances by putting on the floor for cooking, use of open flame equipment for light, faulty heating and electrical system, poverty, illiteracy, and ignorance. This finding was in accordance with the finding of other studies from a various region of India [23,24,25].

Flame was the commonest cause of burn noted in our study. This is in agreement with the other study conducted in India [26,23,24,25,27,28,29]. Among the different sources of flame Kerosene was the main accelerant as kerosene was cheap and easily available because it is used among household/kitchen material such as chimney, stoves, lamp, widely used by Indian people in rural area. Pouring of kerosene on young married women and burning them as a mean of dowry death is not uncommon in India.

Majority of burn (91.0%) were of accidental type, similar finding were reported in various studies [9,10]. Bajpayee 1982, found 97% of cases to be accidental type in his series of 1218 cases.

The overall mortality rate in our study was 39.88. Mortality rate was maximum in the age group of 5-30 years accounting for 73.8%. Mortality increases as TBSA burn increases. In victim with TBSA burn more than 80% mortality CFR was 100%

CONCLUSION AND RECOMMENDATIONS

Fire is a necessary evil. Burn injuries are common in India. Majority are accidental, occur at home, in urban region and are preventable. Higher mortality is found to be associated with female sex, accidental type, flame burn, extreme age group.

Burns are preventable but their management needs a dedicated infrastructure, trained professional and huge resource. Result are often frustrating in terms of high morbidity and mortality. Moreover high population density, illiteracy & poverty are main demographic factor associated with increased risk of burn injury, morbidity and mortality. The cause of burn injury & numbers of victims vary from place to place. Therefore only a community based programme, by

collaboration of surgeons, public health sector and population, can help in preventing burn injury & subsequent mortality.

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