

Retrospective Study on Clinicoepidemiology of Burn Patients in a Tertiary Medical Center from Central India

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Abstract

Introduction: Burns are common injury in both pediatric and adult population. It results in significant disability, morbidity, and mortality. Thermal burns are the most common followed by scald burns. Unsafe usage of “firewood Chula” and kerosene stoves is still common in villages for cooking, this practice along with traditional outfit of saree results in accidental exposure and increased chance of burn injury. It is major public health problem in developing countries.

Materials and Methods: All acute burn cases of all age group, admitted to the burn unit of tertiary care center of Jabalpur, India, were included over a period of 1 year (July 2019–June 2020). Pre-treatment vital clinical parameters were recorded. Burn wound survey was done for site, affected body surface area, degree, depth, severity of injury, and complications. Response to standard fluid and antibiotic treatment was recorded in all patients. Progress of vitals and wound was recorded. All surgeries done over these patients were recorded as the type, timing since burn, number of surgeries, and their complications. All burn-related complications such as sepsis and contractures were recorded. Data were collected and analyzed statistically.

Results: Patient’s ages ranged from 1 to 80 years with a mean age of 34.2 years. The burn was most prevalent in young females of 20–40 age group (31.7%) followed by males of the same age group (14.7%). Overall burns were more common in females (55% of total population), 86% of patients belonged to rural area, 69% were housewife or laborer/farmer. Flame burns were most common 175 (49.58%), followed by scalds 96 (27.20). Three hundred and twelve (88.39%) patients had accidental injury followed by suicidal attempts 22 (06.23%). In majority of patients, there were no predisposing factors. The most common predisposing factor was noticed in electric burn due to poor safety gears of persons involved. One hundred and ninety-seven (55.8%) patients had <50% bovine serum albumin (BSA) involved. About 57.2% of patients had mixed pattern of depth of burn and 30% had second degree burns. Overall mortality was 29.7% (105/353), the mortality in <50% BSA burn was 2% (4/197) while it was 64.7% (101/156) in >50% BSA. Flame burns contributed 67% of death in all patients.

Conclusion: This study provides important aspects of burn injuries for medical and nonmedical health care workers. The majority of burns are accidental seen in young women and men, majority of them were from rural areas and were housewives and laborers. Measures should be taken regarding awareness and education programs about burn prevention to reduce morbidity and mortality associated with it.

Key words: Burns in central India, Clinico- epidemiology of burns, Electrical burns, Thermal burns

INTRODUCTION

Burns are common accidents that have catastrophic influence on people in terms of human life, suffering,

disability, and financial loss, particularly in developing countries due to high population density, poverty, sociocultural factors, illiteracy, erratic electricity supply, and other reasons.^[1] Epidemiological studies on burn patients are important to understand the incidence and magnitude of the problem and its preventive aspects. Majority of burn patients come from rural area, using unsafe kerosene stoves and firewood in earthen fire pot for cooking. This is the most common cause of accidental burn. Poor protection gears used by electricians are common cause of electric burn. Accidental scalds in children often occur in winter

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months of the year. We conducted a study to know the epidemiological profile of burn victims at our institution so that magnitude of the problem in our society is known, and proper preventive strategies are planned.

MATERIALS AND METHODS

This is a retrospective epidemiological study conducted in the tertiary burn care center of central India, Jabalpur. All patients of burns of all causes were included between July 2019 and June 2020. All patients were considered as medicolegal patients. The demographic characteristics, mode of burn injury, time of presentation after burn, comorbidities, and other compounding risk factors were recorded. Pre-treatment vital clinical parameters were recorded. Burn wound survey was done for site, affected body surface area, degree, depth, severity of injury, and complications. Response to standard fluid and antibiotic treatment was recorded in all patients. Progress of vitals and wound was recorded. All surgeries done over these patients were recorded as the type, timing since burn, number of surgeries, and their complications. All burn-related complications such as sepsis and contractures were recorded.

Statistical Analysis

All continuous data were expressed as mean and median. All parametric data were expressed as percent and proportion. Chi-square test and Student's *t*-test were done as and when required. MS Excel and SPSS 11 software were used for statistical analysis.

RESULTS

Three hundred and fifty-three patients of burn were admitted in the study period. Overall mortality was 29.7% (105/353). The mean age of patients was 34.1 years.

The burns were most prevalent in young females of 20–40 age group (31.7%) followed by males of the same age group (14.7%). Overall burns were more common in females (55% of total population), 86% of patients belonged to rural area, 69% were housewife or laborer/farmer [Table 1]. Flame burns were the most common 175 (49.58%) followed by scalds 96 (27.20%) [Table 2]. Three hundred and twelve (88.39%) patients had accidental injury followed by suicidal attempts 22 (06.23%) [Table 3]. In majority of patients, there were no predisposing factors. The most common predisposing factor was noticed in electric burn due to poor safety gears, 35 (9.92%) patients had electric burn due to this followed by epilepsy in 24 (6.80%), alcohol/drug addiction in 18 (5.10%), and depression in 12 (3.39%) cases [Table 4].

Table 1: Demographic characteristics

Parameters	n (%)	n (%)
Age group	Male	Female
0–14	23 (14.47)	32 (16.50)
15–20	20 (12.48)	30 (15.46)
21–40	52 (32.70)	112 (57.73)
41–60	38 (23.90)	12 (06.19)
>60	12 (07.55)	08 (04.12)
Total	159 (100)	194 (100)
Gender		
Male	159 (45.04)	
Female		194 (54.96)
Residence		
Rural	305 (86.40)	
Urban		48 (13.60)
Occupation		
Preschool children	36 (10.20)	
School-going children	19 (05.38)	
Housewives	142 (40.23)	
Skilled workers	28 (07.93)	
Farmer/laborers	102 (28.90)	
Industrial workers (chemical)	26 (07.36)	

Table 2: Cause of burns injury

Cause	n (%)
Flame	175 (49.58)
Scald	96 (27.20)
Electric	58 (16.43)
Chemical	20 (05.67)
Lightening	5 (01.42)

Table 3: Mode of burns

Mode	n (%)
Accidental	312 (88.39)
Suicidal	22 (06.23)
Homicidal	19 (05.38)

Table 4: Risk factors

Risk factors	n (%)
Ill-equipped lineman/electrician	35 (9.92)
Epilepsy	24 (6.80)
Alcohol/drug addiction	18 (5.10)
Depression	12 (3.39)
None	264 (74.79)
Total	353 (100.00)

One hundred and ninety-seven (55.8%) patients had <50% bovine serum albumin (BSA) involved. About 57.2% of patients had mixed pattern of depth of burn and 30% had second degree burns [Table 5]. Total surgeries performed were 213, most common surgery was skin grafting 62 (29.11%) followed by amputations 48 (21.52%) [Table 6]. Most of the amputations were performed in high-tension electric burn patients. Most common complication was septicemia in 83 (37.23%) as a large number of patients

belong to >50% BSA involvement group, followed by pneumonia in 51 (22.87%), and gangrene in 48 (21.52%) cases [Table 7]. 232/353 patients were discharged, majority of these patients were <10% BSA burn group (74 patients, 31.90%) followed by 64 (27.59%) cases in 31–50% BSA group. Overall mortality was 29.7% (105/353), the mortality in <50% BSA burn was 2% (4/197) while it was 64.7% (101/156) in >50% BSA [Table 8]. Flame burns contributed 67% of death in all patients followed by 21% in electric burns group as majority of were high-tension electric contact burns [Table 9]. Sepsis and MODS were the most common cause of death. The outcome was significantly associated with mode of injury, degree, depth, extent, causative agent, and gender.

DISCUSSION

Burns are frequent accident, more so in the developing countries due to low awareness, use of poor safety fire equipment, lack of mass education programs for burn prevention, and resource constraints. These involve higher BSA, associated with significant morbidity and mortality. Rehabilitation services are not so well developed, that is, another area of concern, and lead to long-term disability. Epidemiological studies are necessary to estimate the magnitude of these complex problems for effective burn prevention programs in different population cohorts. The most common age group in our study was between 0 and 10 years (29.09%) and those aged >50 years comprised only 10%. In this study, flame burns were the most frequent and were common in rural, young females. This was generally associated with usage of low safety cooking equipment such as kerosene stoves and earthen chulha. Another possible contributory factor is the habit of sitting on the ground while cooking and wearing synthetic loose clothes. Other studies also noticed similar age group of patients.^[2-6] In this study, female: male ratio was 1.2:1. This is in concordance with other Indian published data.^[4,5,7-10] Social and cultural habits, and dowry-related suicides and homicides are some important reasons for this female preponderance. Hot liquid was the most common burning agent in children ≤10 years while as flame was the most common in adults. Majority of burn injuries in our study were accidental in nature, as compared to suicidal/homicidal. Most of the patients present in the hospital after mean delay of 12 h, often do not receive any treatment, majority of them were in shock. This lack of primary care increases the depth of burn, morbidity, and mortality. People need to be educated about first aid treatment and primary health-care centers should be equipped to provide initial resuscitation and fluid management before referral to tertiary center. This step alone can save many lives. Application of toothpastes, antiseptic ointments, turmeric paste, liquid

Table 5: Degree/depth of burn

Degree of burn	n (%)
First degree	15 (4.25)
Second degree	106 (30.03)
Third degree	30 (8.50)
Mixed	202 (57.22)
Total	353 (100.00)

Table 6: Surgeries performed

Surgery	n (%)
Escharotomy	13 (6.10)
Fasciotomy	39 (18.31)
Tracheostomy	6 (2.82)
Debridement	45 (21.13)
Grafting	62 (29.11)
Amputations	
Single digit/multiple digits	8 (3.75)/11 (5.16)
Below elbow/below knee	14 (6.57)/6 (2.82)
Above elbow/above knee	8 (3.76)/1 (0.47)
Total	213 (100)

Table 7: Complications

Complications	n (%)
Septicemia	83 (37.23)
Pneumonia	51 (22.87)
Corneal ulceration	5 (2.24)
Contractures	
Single	12 (5.38)
Multiple	19 (8.52)
Gangrene	48 (21.52)
Renal failure	5 (2.24)
Total	223 (100)

Table 8: Extent of burn

BSA (%)	Discharged, n (%)	Died, n (%)	DAMA, n (%)
≤10	74 (31.90)	0	2 (12.50)
11–30	45 (19.40)	0	3 (18.75)
31–50	64 (27.59)	04 (3.81)	5 (31.25)
51–70	42 (18.10)	19 (18.10)	6 (37.50)
>70	7 (3.01)	82 (78.09)	0
Total	232 (100)	105 (100)	16 (100)

Table 9: Mortality related to cause of burns

Cause	n (%)
Flame	71 (67.62)
Scald	11 (10.48)
Electric	21 (20.00)
Chemical	0
Lightening	2 (1.90)
Total	105 (100)

ink, and pouring of cold water over the burnt area were the forms of first aid provided by the family members and/or bystanders. This malpractice again leads to delay

and increased complications. Majority of the patients in our study had no known risk factor for burn injury but ill-equipped and inadequately insulated linemen evolved as a major risk factor for sustaining high-voltage electric burn injuries. Since these patients were in productive age group/young adults who sustained a lot of morbidity in the form of multiple surgeries, amputation of their charred and gangrenous hands and feet, it is strongly advocated that they should be provided with proper insulated equipment while going for repair of these high-tension electrical lines. In our study, majority of the patients (70%) had $\leq 20\%$ of BSA burnt. Majority of patients in our study were due to flame that usually causes mixed second- and third-degree burns. Our observations are consistent with those of Ramcharan *et al.*^[11] and Burton *et al.*^[12] Systemic sepsis continues to be a life-threatening condition in burn patients.^[13] In our study most common, complication was septicemia followed by gangrene of limbs/digits. The most common surgical procedure performed was STSG.

CONCLUSION

This study provides important aspects of burn injuries for medical and health care workers. Majority of the burns occurring accidentally in young females of rural area associated with poorly equipped cooking gadgets. Often they have higher BSA involved, poor knowledge of first aid treatment and lack of resuscitation and initial management facilities at primary health center level further complicate the injury. Burn-induced septicemia is the most common cause of death in these patients. Well-equipped burn units and proper implementation of burn management protocols may reduce the morbidity and mortality. Ill-equipped lineman and inadequately maintained lines were a major

risk factor for sustaining high-voltage electric burn injuries. Mass education regarding possible causes, prevention, and initial management may improve the outcome in this disastrous accident.

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