

Electric Burn Profile at A Major Burn Centre in India: A Retrospective Observational Study

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Abstract:

Background: deep tissue loss and substantial morbidity are characteristics of electrical burns, a distinct subclass of thermal injuries.

Objective: to assess the clinical features, care trends, epidemiological profile, and results of electrical burn injuries at a large burn center in India.

Methods: 250 individuals who were admitted with electrical burns over a five-year period were reviewed retrospectively. analysis was done on TBSA, voltage type, demographics, surgical procedures, complications, and results.

Results: electrical burns accounted for 14.8% of total burn admissions. males made up 92% of the population, and 68% of those aged 21 to 40 had the highest prevalence. 72% of injuries were caused by high voltage. the average TBSA was 18%. mortality was 11.2%, 38% underwent fasciotomy/escharotomy, and 24% underwent amputation.

Conclusion: young guys who are economically productive are primarily affected by electrical burns, which are linked to high rates of amputation and surgical intervention. there is an urgent need for preventive workplace safety measures.

Keywords: Voltage Type, Demographics, Surgical Procedures, Complications, Intervention, Safety Measures.

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Introduction

In terms of their etiology, clinical manifestation, and complication profile, electrical burns are essentially different from flame or scald burns. electrical injuries frequently result in severe deep tissue destruction with relatively minor visible wounds, in contrast to thermal burns, which predominantly produce superficial tissue damage proportionate to total body surface area (TBSA) involvement. deep muscular necrosis, vascular damage, and nerve damage result from the body's tissues being extremely heated by the flow of electricity [1]. patients are more likely to develop compartment syndrome as a result of this severe muscle degeneration, which frequently calls for an immediate fasciotomy to preserve limbs. furthermore, because electrical burns cause direct disruptions in myocardial electrical conduction, especially in high-voltage exposures, they are linked

to potentially fatal cardiac arrhythmias [2]. Another severe consequence is renal injury, which is frequently brought on by myoglobinuria from rhabdomyolysis. if this condition is not identified and treated right once, it can lead to acute kidney damage [3].

High-voltage electrical accidents are becoming more common in India, especially among young working men, as a result of growing construction activity, fast urbanization, and lax enforcement of workplace safety laws. the risk is further increased by unregulated electrical infrastructure, informal labor markets, and a lack of utilization of personal protective equipment. electrical injuries frequently result in disproportionate morbidity because of deep tissue damage, multisystem involvement, and a higher risk of surgical interventions, such as

repeated debridement and amputation, even if they entail a smaller TBSA than flame burns [4]. In order to provide useful information for preventative methods and clinical management protocol optimization, the current study intends to examine the demographics, clinical profile, complications, and outcomes of electrical burn patients treated at a major tertiary burn centre [5].

Methods

Study Design: Retrospective descriptive study.

Study Period: 1 years.

Inclusion Criteria

- all confirmed electrical burn admissions.

Exclusion Criteria

- lightning injuries
- incomplete records

Data Collected

- age, sex
- voltage (low <1000v / high \geq 1000v)
- tbsa
- entry & exit wounds
- surgical interventions
- amputation
- complications
- mortality
- length of stay

Statistical Analysis: The data was compiled using descriptive statistics. categorical variables were analyzed using the chi-square test; a p-value of less than 0.05 was deemed statistically significant.

Results

Demographic Distribution

Table 1: age distribution (n=250)

age group	cases	percentage
<10	8	3.2%
11–20	28	11.2%
21–30	92	36.8%
31–40	78	31.2%
41–60	38	15.2%
>60	6	2.4%

Peak: 21–40 years (68%)

Table 2: gender distribution

gender	cases	percentage
male	230	92%
female	20	8%

male: female = 11.5:1

Table 3: injury profile

parameter	value
high voltage	72%
low voltage	28%
mean TBSA	18%
upper limb involvement	64%
lower limb involvement	42%
trunk	30%
entry-exit wounds identified	81%

Table 4: operative procedures

procedure	cases	percentage
debridement	210	84%
fasciotomy/escharotomy	95	38%
skin grafting	168	67%
amputation	60	24%
flap coverage	28	11%

Table 5: clinical outcomes

outcome	percentage
mean hospital stay	28 days
ICU admission	46%
acute kidney injury	14%
sepsis	22%
mortality	11.2%

Discussion

According to the current study, young adult males in their most economically productive years are primarily affected by electrical burns, which still account for a sizable percentage of admissions at major burn centers in India. In line with findings from AIIMS, PIGMER and other tertiary centers, the significant male preponderance and peak incidence in the 21–40 age range suggest occupational exposure and hazardous workplace behaviors [6]. Similar to other Indian research that reported rates between 60 and 75 percent, high-voltage injuries accounted for the majority of patients, which explains the significant requirement for surgical treatments despite very minimal TBSA involvement. Electrical burns frequently result in vascular compromise, compartment syndrome, and deep muscle necrosis, which raises the risk of fasciotomy and amputation [7]. This series' 24% amputation rate is consistent with previous Indian data (18–30%), highlighting the severe functional effects of such events. Our cohort's mortality rate (11.2%) is within the 8–15% range documented in the national literature and is frequently caused by acute kidney injury from myoglobinuria, sepsis, and multiorgan failure. Electrical burn management is resource-intensive, as evidenced by the length of hospital stay and frequent need for critical care units. Crucially, the TBSA by itself understates the severity of these injuries, highlighting the necessity of multimodal care and vigorous early evaluation [8]. To lower the frequency and socioeconomic impact of electrical burns in India, preventive measures are crucial. These include enhanced electrical infrastructure, public awareness campaigns, the use of protective gear, and the rigorous implementation of occupational safety laws [9].

Conclusion

In India, electrical burns continue to be a serious public health concern and account for a significant percentage of burn admissions at tertiary care facilities. Young adult males are primarily affected, especially those who work in high-risk occupations. Common high-voltage injuries are linked to profound tissue destruction, which increases the need for surgery and raises the rate of amputation.

because of related consequences including sepsis and multiorgan failure, mortality from burns is still high even with advancements in care. The incidence and burden of electrical burn injuries can be decreased by strengthening workplace safety laws, making sure insulation standards are met, and raising public awareness.

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