Archives of Current Medical Research
Arch Curr Med Res 2025; 6(3): 320-325

Received: 23 August 2025
Revised: 28 May 2025
Accepted: 08 September 2025
DOI: 10.47482/acmr.1771236

ORIGINAL ARTICLE

The Role of Epileptic Seizures in Burn Etiology: A Burn Center Experience

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Abstract

Background: During epileptic seizures, individuals are vulnerable to trauma and secondary injuries due to their inability to protect themselves. Among these injuries, burns can lead to significant morbidity and even mortality. The aim of this study is to present data on the clinical features and treatment methods of burns due to epileptic seizures treated in our burn center.

Methods: Digital records of patients who were hospitalized and treated at our burn center between January 2022 and June 2025 were retrospectively analyzed. Patients aged 18 years and older who sustained burn injuries during epileptic seizures constituted the study group. Demographic data, burn etiology, burn characteristics, treatment methods, and length of hospital stay were recorded and analyzed.

Results: Among the 1652 patients evaluated during the study period, burn injuries related to epileptic seizures were identified in 17 cases (1.02%). The median age was 43 years (range: 21–67), and 52.8% of the patients were female. Scalding was the most common cause of burns (76.5%), and all incidents occurred in a home environment. The most frequently affected area was the lower extremities (52.9%). In 58.8% of the cases, the total body surface area (TBSA) affected was less than 10%. Surgical grafting was required in only two patients, and no amputations were needed.

Conclusion: Burn injuries sustained during epileptic seizures represent a preventable but significant cause of morbidity. Enhancing household safety measures, ensuring regular follow-up for epilepsy patients, and implementing educational programs may be effective in preventing such injuries.

Keywords: Burn injuries, epilepsy, preventable morbidity, seizure-related trauma.

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INTRODUCTION

Burn injuries constitute a substantial proportion of trauma-related hospital admissions worldwide. These injuries can result from contact with hot liquids, exposure to flames, various chemicals, or electrical accidents (1). The severity of burns ranges from minor injuries requiring minimal intervention to life-threatening conditions demanding extensive medical care (2). Particularly, severe burn injuries necessitate referral to advanced burn centers. Extended hospital stays and prolonged rehabilitation following discharge impose significant burdens on both patients and healthcare systems. Therefore, identifying preventable causes of burns and implementing corresponding preventive measures is crucial to reducing their frequency (2,3).

Burns sustained during epileptic seizures represent a specific category of preventable injuries. Epilepsy is one of the most common neurological disorders, affecting over 70 million individuals worldwide and accounting for approximately 0.5% of the global burden of disease (4). Due to the sudden onset of seizures, individuals with epilepsy are unable to protect themselves from environmental heat sources. Loss of consciousness can lead to burns when patients come into contact with fire or other flammable materials during a seizure (5). Consequently, research focusing on burn injuries in epileptic patients is of great clinical importance.

The primary aim of this study was to determine the relationship between burn injuries of various etiologies treated in our burn center and epileptic seizures. The secondary aim was to identify the causes, characteristics, and treatment outcomes of burns occurring in patients with epilepsy.

MATERIALS AND METHODS

Study design and patient selection

This single-center, retrospective study was conducted at the burn center affiliated with the general surgery department of a tertiary referral hospital between January 2022 and June 2025. Data were obtained by retrospectively reviewing digital medical records in the hospital information system for patients over 18 years of age admitted to the burn ward.

Inclusion Criteria: Burn etiologies were scanned from digital medical history forms in inpatient records from the study period. Patients with a history of burn injuries that occurred during epileptic seizures were included in the study.

Exclusion Criteria: Patients under 18 years of age, burn cases not associated with epileptic seizures, and patients with incomplete medical records were excluded from the study.

Patient demographics, burn etiology, burn area and percentage, epilepsy history, burn-related treatments, and length of hospital stay were recorded and analyzed. Incidence was calculated as the proportion of injuries related to epileptic seizures among burn patients admitted during the study period.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 29.0. (IBM Corp., Armonk, NY, USA). Normality of continuous variables was assessed with the Kolmogorov–Smirnov and Shapiro–Wilk tests. Categorical data were expressed as frequency and percentage [% (n)], normally distributed continuous variables as mean ± standard deviation, and non-normally distributed data as median (minimum-maximum or interquartile range; IQR = Q1–Q3).

Ethical Approval

This study followed the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines. The protocol complied with the ethical principles of the Declaration of Helsinki. This study was approved by the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee (approval date:02.07.2025 / decision no:239). Informed consent was obtained from all patients during hospitalization. Patients undergoing major surgery also provided written consent after surgical details were explained.

RESULTS

During the study period, 2866 patients were admitted to our burn center. Of them, 1214 were under 18 years old and were excluded. The records of 1652 adult patients were reviewed, revealing that 17 were admitted due to burns incurred during epileptic seizures. The

incidence of seizure-related burn injuries was 1.02% among adult admissions. The age distribution of the entire cohort included 987 patients aged 18–44, 476 aged 45–64, and 189 aged ≥65. The incidence of seizure-related burns was 0.91%, 1.47%, and 0.52% in these age groups, respectively. All patients who sustained burn injuries during epileptic seizures were initially evaluated in our hospital emergency department. None of the patients were experiencing active seizures, and all were in the post-seizure period.

Table 1. Demographic data and hospitalization information of patients

Age[a]	43 (21-67)
Gender[b]	
Female	9 (52.8)
Male	8 (47.2)
Comorbidity,Yes[b]	7 (41.2)
Length of hospital stay[a]	10 (9 -13.2)
Intensive care hospitalization day[a]	0 (0-3)
Regular medication use, No[b]	7 (41.2)

[a]= median (interquartile range; Q1–Q3), [b]= n(%)

The median age of the 17 seizure-related burn patients was 43 years (range: 21–67), and 52.8% were female. Seven patients (41.2%) had epilepsy and at least one additional chronic disease (Table 1). All burns occurred in a home setting, with 76.5% caused by scalding. Lower extremities were the most frequently affected region (52.9%). In 58.8% of cases, the total body surface area (TBSA) burned was below 10% (Table 2). All patients received daily burn dressings and alternate-day debridement. Two patients required split-thickness skin grafts. No amputations were performed. Antiepileptic treatments were adjusted based on neurology consultations. No mortality was observed in any patient during hospitalization or follow-up.

The patients' burn treatments were managed in the burn unit, along with their anti-epileptic medications. After discharge, they were checked weekly at the burn center outpatient clinic for the first 30 days. Subsequent follow-up visits were determined based on the condition of the burn wound. Neurology outpatient clinic check-ups for epilepsy treatments continued monthly. No patient was rehospitalized due to burn injuries during the follow-up period.

Table 2. Etiologies and characteristics of burns	
Cause of burn	**n (%)**
Scald burns	**13 (76.5)**
Hot water	4 (30.7)
Hot oil	4 (30.7)
Teapot overturned	4 (30.7)
Shower	1 (7.9)
Flame burns	**4 (23.5)**
Major burned areas	
Lower extremity	9 (52.9)
Upper extremity	4 (23.5)
Body	4 (23.5)
Total burn percentage	
<10%	10 (58.8)
10-20%	5 (29.4)
21-30%	2 (11.8)
Major burn degree	
Second degree	12 (70.6)
Third degree	5 (29.4)

DISCUSSION

In our tertiary burn center, the admission rate for burn injuries due to epileptic seizures in adults was 1.02%. Ahmad et al. reported that 7.2% of burn patients had injuries related to neuropsychiatric disorders; however, their study included all neuropsychiatric conditions (3). A study focused solely on seizure-related burns found that 0.84% of admissions were seizure-associated (6). Another similar study reported a 1.7% rate of seizure-related burns and noted that 82% occurred at home (7). In our series, all burns occurred in home settings, often during food preparation, tea or coffee consumption, or bathing.

In rural-population studies, the average age was reported as 24.6 years, with scalds and flame burns being most common (8). Seizure-related burns are more frequent in younger patients, with mean ages reported between 25–30 years (6–8). Although this has been attributed to poorer medication compliance among younger individuals, small sample sizes limit generalizability. Our median patient age is consistent with literature, but, unlike other studies, most patients in our series adhered to their medications. Female sex was predominant in studies reporting kitchen-related seizure burns. Sener Bahce et al. reported that 94% occurred at home and 78% of cases were female, with upper extremity burns being most common (9). Jahan et al. reported 68% upper extremity burns (6). However, in our study, lower extremity burns (52.9%) predominated—likely explained by the tendency to remain standing and spill hot liquids downward while performing household tasks. This is associated with relatively lower TBSA involvement (8,10). In our series, 58.8% of burns had a TBSA <10%.

Burn treatment involves dressings, debridement, grafting, and sometimes amputation. In a study of 184 seizure-related burn patients, 76% underwent surgical debridement and 19% required amputation—mostly of the hand (11). Our center's high-level resources allowed comprehensive care including multiple debridements and escharectomy, and no amputations were necessary. In low-resource settings, burn patients may require more aggressive interventions; one study reported 43% amputation rate among seizure-related burns due to delayed intervention and deeper burns (12). While mortality remains uncommon, it has been reported; Zia et al. documented a 7.5% mortality rate in seizure-related burns (13).

Epilepsy is more prevalent in low- and middle-income countries, with Africa bearing 20% of the global burden (14). In Malawi, seizure-related burn patients often lived in rural areas with limited access to healthcare, and comorbidities were common (15). Lifetime prevalence of seizure-related injuries in epilepsy patients is approximately 10% (16). Asiri et al. reported injury types and rates as follows: soft-tissue trauma 36.5%, head trauma 32%, dental injuries 8.5%, and burns 7%, with half experiencing recurrent injuries (17).

Epileptic patients represent a high-risk group for burns. While a direct relationship between seizure history and burn severity could not be established in this study, unanticipated seizures result in impaired motor coordination and situational awareness, increasing vulnerability to burns and other injuries. Thus, regular neurology follow-up, appropriate antiepileptic therapy, and seizure-control programs are crucial. Moreover, home safety measures—such as fire alarms—are beneficial, and educational programs for patients can effectively mitigate risk.

This study has several limitations, including its retrospective design, single-center nature, and low case number. This limits the generalizability of the data presented. Many studies in the literature originate from resource-limited countries. Differences between our data and those from the literature may be influenced by the higher healthcare access in our study population.

Burn injuries resulting from epileptic seizures continue to cause significant morbidity and, in some cases, mortality. Regular follow-up, optimized medical therapy, medication compliance programs, and awareness education for epilepsy patients may effectively reduce seizure-related burns.

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Abbreviations list

IQR: Interquartile range
STROBE: Strengthening the reporting of observational studies in epidemiology
TBSA: Total body surface area

Ethics approval and consent to participate

The study was conducted following the Declaration of Helsinki and Ethical Principles for Medical Research. This study was approved by the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee (approval date:02.07.2025 / decision no:239). Consent forms were obtained from the patients for the study.

Consent for publication

Informed consent was obtained from all individual adult participants included in this study.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no conflict of interest.

Funding

All financial expenses are covered by the authors. There is no financial support.

Authors' contributions

Idea/Concept: HK,MT. Design: HK,FG,MK. Control/Supervision: FAI,MK,MT. Data Collection And/Or Processing: HK, FG, MK. Analysis And/Or Interpretation: HK, FAI. Literature Review: HK,FG,FAI. Writing The Article: HK,FG,MK. Critical Review: FAI,MT. References And Fundings: HK,MK,FAI,MT . Materials: HK,FG,FAI. Other: HK,FG,MK,FAI,MT.

Acknowledgements

None.