Research Article/ Araştırma Makalesi DOI: 10.61845/agrimedical.1578515

Investigation of burn cases presenting to the emergency department: Clinical practices and epidemiological features

Acil servise başvuran yanık vakalarının incelenmesi: Klinik uygulamalar ve epidemiyolojik özellikler

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ABSTRACT

Aim: The clinical and epidemiological characteristics of patients presenting to the emergency department with burn injuries were evaluated. The treatments were compared with current studies, and the findings were presented to contribute to the literature.

Material and Method: The study included patients admitted to the hospital with burn injuries in 2022 year. Electronic records, e-prescriptions, and patient files were retrospectively reviewed. The obtained data were analyzed and presented.

Results: A large portion of the 131 patients in our study are adolescents and children (32.8%). The most affected area is the upper extremities, and second-degree burns are generally observed (37.4%). The type of injury is usually thermal burns and scalds (56.4%). Cases are most seen in the summer months (32.1%). While burn injuries are more common during working hours in the general population, these injuries occur out of working hours' (59%) and at home (95.4%) in the pediatric age group. Patients were generally given wound dressing, wound cleaning (It involves washing the wound with isotonic saline solution and removing necrotic tissue and foreign bodies, if present), analgesia, and tetanus prophylaxis. At the time of the first visit, 27.5% of the patients were treated with antibiotics, and 31.3% were prescribed antibiotics at discharge.

Conclusion: Burn injuries are common traumas. The use of antibiotics during initial intervention and discharge is remarkably high. Children are more frequently affected by burn injuries. Particularly in this age group, there is a need to develop protective and preventive approaches.

Keywords: Burn, emergency department, antibiotic treatment, child

ÖZ

Amaç: Acil servise yanık yaralanması nedeniyle başvuran hastaların klinik ve epidemiyolojik özellikleri değerlendirildi. Uygulanan tedaviler güncel çalışmalarla karşılaştırılarak elde edilen bulgular literatüre katkı sağlamak amacıyla sunuldu.

Gereç ve Yöntem: Çalışmaya 2022 yılında yanık yaralanması ile hastaneye başvuran hastalar dahil edildi. Elektronik kayıtlar, e-reçeteler ve hasta dosyaları retrospektif olarak incelendi. Elde edilen veriler analiz edildi ve sunuldu.

Bulgular: Çalışmamıza dahil edilen 131 hastanın büyük bir kısmını adölesanlar ve çocuklar oluşturmaktadır (%32,8). Üst ekstremiteler en sık etkilenen bölgedir ve genellikle ikinci derece yanıklar görülmektedir (%37,4). Yaralanma şekli genellikle termal yanıklar ve haşlanma şeklindedir (%56,4). Vakalar en sık yaz aylarında görülmektedir (%32,1). Genel popülasyonda yanık yaralanmaları mesai saatlerinde daha yaygınken, çocuk yaş grubunda bu yaralanmalar mesai saatleri dışında (%59) ve evde meydana gelmektedir (%95,4). Başvuran hastalara genellikle yara pansumanı, yara temizliği, analjezi ve tetanoz profilaksisi yapılmıştır. Hastaların ilk başvuru anında %27,5'ine antibiyotik tedavisi uygulanmış ve taburculuk sırasında %31,3'üne antibiyotik reçete edilmiştir.

Sonuç: Yanık nedenli yaralanmalar sık karşılaşılan travmalardır. İlk müdahale ve taburculukta antibiyotik kullanımı dikkat çekici şekilde fazladır. Yanık nedenli yaralanmalarda çocuklar daha sık etkilenmektedir. Özellikle bu yaş gurubunda koruyucu ve önleyici yaklaşımların geliştirilmesine ihtiyaç vardır.

Anahtar Kelimeler: Yanık, acil servis, antibiyotik tedavisi, çocuk

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Gönderilme Tarihi: 03/11/2024
Kabul Tarihi: 08/01/2025
Yayınlanma Tarihi: 01/02/2025

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Cite this article: Bozatlı SBH, Çeliktürk E, Sayhan MB. Investigation of burn cases presenting to the emergency department: Clinical practices and epidemiological features. Ağrı Med J. 2025; 3(1): 19-23.

Introduction

Burn injury is a type of trauma caused by thermal, chemical, radioactive, or electromagnetic energy that affects the skin, subcutaneous tissues, or other organs and organ system (1). Burn injuries are a significant health problem, especially in developing countries (2,3). Burn-related injuries can be categorized as first-degree burns, which affect only the epidermis; second-degree burns, which affect the epidermis and the upper layer of the dermis; third-degree burns, which affect the epidermis, dermis, and underlying fat, muscle, and bone tissues; and fourth-degree burns, which affect deeper tissues. Additionally, burns can be classified into inhalation burns, which affect the respiratory tract; chemical burns, which occur due to contact with acidic or alkaline substances; electrical burns, which cause severe damage to deep tissues; and burns affecting the face, eyes, and genital areas (1). The fundamental principles of burn treatment include cooling and cleaning, fluid resuscitation, pain management, and infection control (1). In severe cases, surgical intervention, long-term physical therapy, and psychological support may be required (4). The number of specialized centers for burn treatment is rapidly increasing. However, a significant portion of visits to healthcare centers due to burn injuries consists of minor injuries, including first and second-degree burns (5).

Materials and Methods

The sample of this study consists of patients who presented with burn injuries to Trakya University Faculty of Medicine Hospital in 2022. Ethical approval was obtained on 09/01/2023 with decision number 01/04. The age, gender, burn type, affected body surface area, burn depth, anatomical region affected by the burn, burn mechanism, treatments administered in the hospital, hospitalization and discharge status, and medications prescribed at discharge were retrospectively reviewed from patient records and electronic hospital records. Burn surface area was assessed using the "Rule of Nines" for adults and the "Lund-Browder chart" for pediatric patients (4). Burn depth was recorded according to the "Burn Injury Treatment Algorithm" published by the Turkish Ministry of Health in 2012 (6). Affected body regions were determined based on the anatomical locations recorded by physicians in patient charts and the electronic hospital database. Burn types and causes were classified based on explanations given in patient histories. No patients with third-degree deep and infected burns or inhalation-related burns presented to our hospital. Additionally, there were no patients receiving immunosuppressive treatment.

Treatments administered at discharge and medications prescribed were grouped based on data from the electronic prescription system and patient records.

Statistical analysis

In this study, data were analyzed using descriptive statistics, and categorical variables were presented as frequency (n) and percentage (%). Data analyses were performed using SPSS 22.0 software. Since the study aimed to provide only descriptive analyses, no comparisons were made between groups.

Results

Of the 131 patients included in the study, 49.6% were male (n=65), and 50.4% were female (n=66). The patients' ages ranged from 8 months to 81 years, with a mean age of 26.17 and a median age of 22. 29.7% (n=39) of the patients were under ten years old. The age and gender distributions are presented in Figure 1.

Domestic accidents caused 90.9% (n=119) of burn injuries, while other locations included gardens (3%, n=4) and workplaces (6.1%, n=8). Burn injuries were more common in the summer months (32.1%, n=42) and during working hours (61%). The monthly distribution of cases is presented in Figure 2.

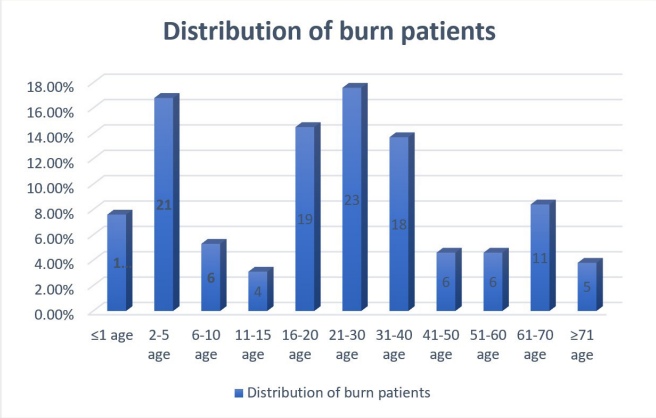

Figure 1. Distribution of burn patients by age group

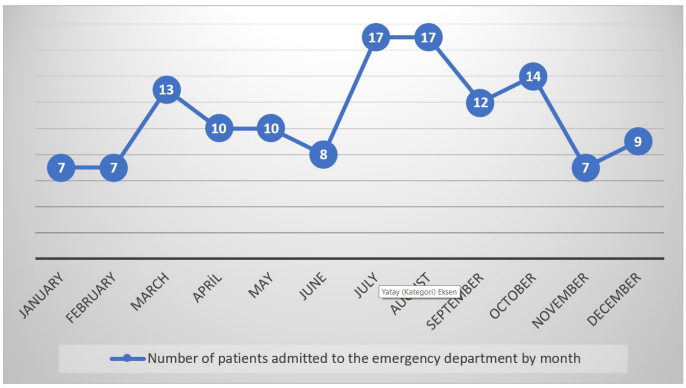

Figure 2. Monthly distribution of patients admitted with burn injuries

The most frequently affected body regions were the hands, wrists, and distal arms, affected in 37.4% (n=49) of cases. 94.5% (n=138) of burn cases involved 10% or less of the body surface area. 54.7% (n=80) of the burns were second-degree burns. No patient had a total affected body surface area greater than 20% or a burn depth more severe than second-degree burns. The distribution of burns by body location, percentage of burned skin, and burn degree is shown in Table 1. 98.4% (n=129) of the burns were caused by heat sources, with hot water being the most common cause (56.4%, n=74). The distribution of burns by type and cause is presented in Table 2.

All patients received wound dressing, skin cleaning, antiseptic and antibacterial solutions for wound care, and topical analgesics; however, no debridement was performed. During discharge, 27.5% of the patients were prescribed parenteral antibiotics, and 31.3% were prescribed enteral antibiotics. The medical treatments applied, and medications prescribed at discharge are shown in Table 3.

Sixteen burn cases were classified as forensic cases. In the majority of these forensic cases, burn injuries resulted from contact with hot water in domestic settings. The fact that information related to these forensic cases was documented in forensic records rather than patients' emergency department files prevented us from analyzing the physicians' assessment criteria in emergency department admissions due to burn-related injuries. Further studies are needed to determine the specific aspects considered by physicians in reporting forensic cases. These issues constitute limitations of our retrospective study.

Table 1. Distribution according to affected body area, percentage of burned skin and degree of burn

Body area			Burning Skin Percent (n*)			Burn Degree (n*)		
	n*	%	≤10%	10%-20%	≥20%	First degree	Second degree	Third degree
Head, neck and face	11	8.4	11	-	-	4	7	-
Hand, wrist and distal arm	49	37.4	49	-	-	29	20	-
Arm	41	31.3	41	-	-	21	20	-
Femur and hip	19	14.5						
17	2	-	5	14	-			
Distal part of the foot, ankle and knee	13	9.9	13	-	-	2	11	-
Genital area	1	0.8	1	-	-	1	-	-
Chest	12	9.2	6	6	-	4	8	-
Eye	-	-	-	-	-	-	-	-
Respiratory system	-	-	-	-	-	-	-	-
Total	146	100	138	8	-	66	80	-

*n denotes the number of cases included in the analysis

Table 2. Distribution of patients according to burn type and cause

Burn Type (n*)				Burn Cause (n*)				
Age	Thermal	Friction	Chemical	Tea	Gas	Boiling water	Contact with hot surface	Other flammable substances
≤1	10	-	-	3	1	3	2	1
2-5	21	1	-	1	-	18	3	-
6-10	6	-	1	-	-	5	1	1
11-15	4	-	-	-	-	4	-	-
16-20	19	-	-	2	2	7	5	3
21-30	23	-	-	6	-	10	6	1
31-40	18	-	-	3	1	7	5	2
41-50	6	-	-	-	-	6	-	-
51-60	6	-	-	1	1	3	1	-
61-70	11	-	-	2	-	9	-	-
71 ≤	5	-	-	1	2	2	-	-
Total	129	1	1	19	7	74	23	8

*n denotes the number of cases included in the analysis

Table 3. Initial treatments and prescribed medications at discharge*

	When admitted to the** emergency room		On discharge***	
	n	%	n	%
Wound dressing	131	100	-	-
Topical analgesic drugs	38	29	44	33.6
Parenteral antibiotics	36	27.5	-	-
Enteral antibiotics	-	-	41	31.3
Parenteral analgesics	41	31.3	-	-
Tetanus prophylaxis	31	23.7	-	-
Enteral analgesics	-	-	36	27.5
Antiseptic, antibacterial topical medicines	-	-	45	34.4

* Descriptive statistics are presented as frequencies and percentages.** When admitted to the emergency room: Refers to the treatments and interventions applied during the initial admission to the emergency department, *** On discharge: Refers to the medications and prescriptions given at the time of discharge from the emergency department.

One patient presented with an additional fracture of the arm, and a direct X-ray was taken. This fracture was identified as being caused by a simple fall that occurred prior to the burn-related injury. Thirteen patients required consultation with the plastic and reconstructive surgery department and one required consultation with an internal medicine specialist. These patients had burn injuries to the head, neck, and face regions or had chronic conditions.

Thirteen patients had at least one chronic condition (hypertension or diabetes). One patient had chronic renal failure, and another was bedridden due to a previous cerebrovascular accident. No patient was hospitalized at the initial presentation. Twenty-four patients were readmitted after discharge, and eight (33.3%) were hospitalized. All eight readmitted and hospitalized patients had at least one chronic condition, such as diabetes or hypertension. The reasons for hospitalization in subsequent admissions were not detailed in the medical records. Information regarding hospitalization is based on initial diagnoses and evaluations. Our study found a high hospitalization rate among burn injury patients with comorbidities who presented for subsequent admissions, suggesting a potential association with an increased risk of complications. However, further studies are needed to confirm this association. Additionally, the retrospective nature of our study suggests that subjective factors may have influenced the initial evaluations at the first admission.

Discussion

This retrospective study examined the epidemiological and clinical characteristics of patients who presented with burn injuries to the emergency department. The findings confirm that burn injuries are a common health problem, particularly affecting children. This is consistent with the findings of Dissanaike and Rahimi (2009), who emphasized that children are more vulnerable to burn injuries (3).

Our study found that burns most frequently occurred in the summer months. This finding is similar to the results of a study conducted by Al et al. (2005) in the Eastern and Southeastern Anatolia regions while differing from the findings of Sarıtaş et al. (2011) and Bayramoğlu et al. (2016), who reported a higher incidence in the spring and autumn months (8-10).

Most burns were caused by domestic accidents, consistent with the findings of Akkoç and Özdemir (2022) from a study at Dicle University Burn Center (5). The hands, wrists, and distal arms were the most frequently affected body regions, aligning with Bayramoğlu et al. (2016), who found that hot liquid burns most commonly affected the upper extremities (9).

Our study had no significant difference in the number of male and female patients. However, this contrasts with the findings of Eser et al. (2016), Sarıtaş et al. (2011), and Bayramoğlu et al. (2016), who reported that women were more frequently affected by burns (7-9). This discrepancy may be due to the higher incidence of domestic burns, regional differences in women's participation in the workforce, and other socio-demographic factors (11). However, extensive regional studies on burn injuries and socio-demographic characteristics are needed for a comprehensive evaluation.

The proportion of pediatric and adolescent burn patients presenting to our emergency department was 32.8%. This is lower than the rates reported in studies by Yolcu et al. (2013), Al et al. (2005), and Akkoç et al. (2022) (5,10,12). This discrepancy may be related to regional differences in women's participation in the workforce, early marriages, fertility rates, and maternal-child ratios, but further extensive research is needed (13).

Antibiotic use in burn injuries is indicated for deep, extensive burns, burns showing signs of infection, immunocompromised patients, and burns in areas with a high risk of infection (10). However, our study found that many patients received antibiotic treatment, and antibiotics were prescribed at discharge. Studies by Erol et al. (2004), Yearmaz et al. (2014), Tartar et al. (2015), and Karahocagil et al. (2007) have highlighted the issue of excessive and unnecessary antibiotic use (15-18). Considering that antibiotics are unnecessary for minor burns, this raises concerns about the contribution to antibiotic resistance. The study by Arpacık and Kaymakcı (2023) showed that emergency physicians had a low level of knowledge about treating pediatric burn patients, which may contribute to the overuse of antibiotics (14).

Study Limitations

The retrospective and single-center nature of this study limits the generalizability of its results.

Conclusion

This retrospective study examined the characteristics of minor burn patients presenting to the emergency department. It found that children are more vulnerable to burns and that these injuries are caused mainly by domestic accidents. Additionally, excessive antibiotic use in emergency departments was observed. This highlights the need to develop burn prevention strategies for children and optimize antibiotic use in emergency departments. Future studies should further investigate these areas.

Conflict of interest

The authors declare no conflicts of interest related to the publication of this article.

Ethical approval

Ethics Committee Approval: The study approved by Trakya University Faculty of Medicine Non-Interventional Scientific Research Ethics Committee (protocol no: 09/01/2023-01/04)

Funding support

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Author's contributions

S.B.H.B: Design, data collection, processing, practice, analysis, literature search, writing. **E.Ç:** Data Collection, processing, analysis, writing, critical review. **M.B.S:** Literature search, writing, critical review.

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