

Evaluation of Pediatric Cases Followed in Burn Center

Yanık Merkezinde Takibi Yapılan Pediatrik Olguların Değerlendirilmesi

Yaşar BİLDİRİCİ

Department of Pediatrics, Eskisehir City Hospital, Eskisehir, Turkey



ABSTRACT

Objective: Burn injuries are among the most important causes of unintentional death in young children. Although most pediatric burns do not cause serious clinical problems, severe burns have a higher mortality rate than adult patients with similar burns. In this study, we aimed to discuss the clinical features of pediatric burn patients hospitalized in the Burn Center of Eskisehir City Hospital.

Material and Methods: This study evaluated pediatric patients between the ages of 0 -18 years who were hospitalized and followed up between June 1, 2019 and August 1, 2023 at the Burn Center of Eskisehir City Hospital were evaluated retrospectively. Patients were evaluated according to age, gender, presence of chronic diseases, parenteral treatment rates, types of burns, total body surface area and the area affected by the burn.

Results: The most common burn type was scald burn with 89.5% (n=246). According to the types of burns, especially scalding and flame burns were found to have a longer hospitalization period than electrical burns. While there was a significant correlation between the percentage of burns and the duration of intensive care unit stay and hospitalization (p=0.001), the number of operations increased as the percentage of burns increased (p=0.072).

Conclusion: Exposure to burns was mostly observed in children aged 0-24 months. Burns may cause more serious consequences in pediatric cases. By looking at the types of burns in pediatric patients according to age groups, we think that burn cases in this age group can be reduced by raising awareness of families and taking precautions.

Key Words: Burn, Burn Unit, Children, Electrical Burn

ÖZ

Amaç: Yanık yaralanmaları, küçük çocuklarda, istem dışı ölümlerin en önemli nedenleri arasında yer almaktadır. Pediatrik yanıkların çoğu ciddi klinik sorunlara yol açmamakla birlikte, ciddi yanıklarda benzer yanıklara sahip erişkin yaş grubu olgulara göre daha yüksek mortaliteye sahiptir. Bu çalışmada, Eskisehir Şehir Hastanesi Yanık Merkezi'nde yatan çocuk yanık hastalarının klinik özelliklerini tartışmayı amaçladık.

Gereç ve Yöntemler: Bu çalışmada Eskisehir Şehir Hastanesi Yanık Merkezi'nde 1 Haziran 2019 - 1 Ağustos 2023 tarihleri arasında yatırılarak takip edilen 0-18 yaş arası çocuk hastalar retrospektif olarak değerlendirildi. Hastalar yaş, cinsiyet, kronik hastalık varlığı, parenteral tedavi oranları, yanık tipleri, toplam vücut yüzey alanı ve yanıktan etkilenen alana göre sınıflandırıldı.

Bulgular: En sık yanık türü %89.5 (n= 246) ile haşlanma yanığıydı. Yanık türlerine göre özellikle haşlanma ve alev yanıklarında elektrik yanıklarına göre yatış süresinin daha uzun olduğu saptandı. Yanık yüzdesi ile yoğun bakım yatış süresi ve hastane yatış süresi arasında anlamlı ilişki saptanırken (p=0.001), yanık yüzdesi arttıkça operasyon sayısının da artış gösterdiği belirlendi (p=0.072).



0000-0002-4784-7810 : BİLDİRİCİ Y

Conflict of Interest / Çıkar Çatışması: On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethics Committee Approval / Etik Kurul Onayı: This study was conducted in accordance with the Helsinki Declaration Principles. This study was approved by the decision of the Eskisehir City Hospital Non-Interventional Ethics Committee ESH/GOEK-2023/43 was conducted in accordance with the principles of the Declaration of Helsinki and all relevant legislation.

Contribution of the Authors / Yazarların katkısı: BİLDİRİCİ Y: Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the Conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study, Reviewing the article before submission scientifically besides spelling and grammar.

How to cite / Atıf yazım şekli : Bildirici Y. Evaluation of Pediatric Cases Followed in Burn Center. Turkish J Pediatr Dis 2023;17:401-405.

Correspondence Address / Yazışma Adresi:

Yaşar BİLDİRİCİ

Department of Pediatrics, Eskisehir City Hospital, Eskisehir, Turkey
E-posta: drybildirici@gmail.com

Received / Geliş tarihi : 17.08.2023

Accepted / Kabul tarihi : 18.09.2023

Online published : 19.09.2023

Elektronik yayın tarihi

DOI: 10.12956/tchd.1344991

Sonuç: Yanık maruziyeti en çok 0-24 ay arası çocuklarda görülmektedir. Yanıklar pediatrik olgularda daha ciddi sonuçlara yol açabilmektedir. Çocuk hastalarda yanık tiplerine ve yaş gruplarına göre bakıldığında ailelerin bilinçlendirilmesi ve önlem alınması ile bu yaş grubundaki yanık vakalarının azaltılabileceğini düşünmekteyiz.

Anahtar Sözcükler: Yanık, Yanık Ünitesi, Elektrik Yanığı, Çocuk

INTRODUCTION

The skin is the largest organ in the body and consists of the epidermis and dermis. The skin acts as a barrier to infection and radiation, maintains fluid-electrolyte balance and provides thermal regulation. A burn is a trauma with high mortality and morbidity that results in necrosis of part or all of the epidermis and dermis, usually due to thermal contact. Causes of burns include thermal burns, burns caused by electrical current, flame and inhalation injuries, chemical burns, contact burns and scalding burns. Age, sex, cause of burn, percentage and degree of burn are determinants of mortality and morbidity (1). Burn injuries are among the leading causes of unintentional death in young children. Although most pediatric burns do not result in serious clinical problems, severe burns have a higher mortality rate compared to adult patients with similar burns (2,3).

The most common burns in pediatric patients are thermal burns caused by scalding or contact with hot food (2). Non-food thermal burns can be caused by fireworks, irons or campfires. Chemical burns can be caused by many common cleaning products or topical or mucosal contact with various acidic or alkaline products (2,4,5). Although electrical burns are most common in adults, exposures can also occur in children. Electrical burns cause little visible damage to the body because most of the damage occurs in deeper tissues. However, electrical burns can also cause nerve and muscle damage and arrhythmias (2,6).

In this study, we aimed to discuss the clinical characteristics of pediatric patients admitted to the burn centre of Eskişehir City Hospital, the only burn centre in Eskişehir province, in the literature.

MATERIALS and METHODS

This study evaluated pediatric patients between the ages of 0 and 18 years who were hospitalized and followed up between June 1, 2019 and August 1, 2023 at the Burn Center of Eskişehir City Hospital were evaluated retrospectively. Patients were evaluated according to age, gender, presence of chronic diseases, burn types, percentage of total body surface area (TBSA) and area affected by the burn, number of surgeries performed, and length of stay in the ward and intensive care unit were recorded. Discharge, parental request and death were recorded. Data were obtained retrospectively from the hospital information system and patient records.

This study was approved by the Eskişehir City Hospital Non-Interventional Ethics Committee with the decision of ESH/GOEK-2023/43 dated August 17, 2023 and was conducted in accordance with the principles of the Declaration of Helsinki and all relevant legislation.

Statistical method:

All data were analysed using the Statistical Package for the Social Sciences (SPSS) 21.0 (IBM SPSS Statistics for Windows, version 21.0. Armonk, NY: IBM Corp). Continuous variables were analysed using Independent sample T-test or Mann-Whitney U-test, considering data distribution and homogeneity. Data were expressed as the mean \pm standard deviation (SD) when they were normally distributed and as the median when they were not normally distributed. Categorical variables are expressed as percentages. The Pearson chi-square test was used for the relationship between two categorical variables. The Shapiro-Wilk test was used to determine whether the data were normally distributed. The normality assumption of the variability between the medians of the independent groups was assessed using the Kruskal-Wallis test. Groups were compared within themselves. The results were evaluated at the 95% confidence interval and significance was evaluated at the $p < 0.050$ level.

RESULTS

Of the 275 patients who participated in the study, 58.5% ($n=161$) were male. The age of the patients ranged from 0 to 16 years, with a median age of 2 years (min: 0, max: 16). The most common type of burn was scalding with 89.5% ($n=246$). Some characteristics of the patients that may be associated with burns are shown in Table I.

Scald burns were more common in the younger age group and electrical and flame burns were more common in the school age group. Table II provides information on the type of burn and age of onset.

In the study, the total body area burn percentage ranged from 1-60, and the median percentage was 8. Table III shows the relationship between the median values of burn percentage, mean number of surgeries, and length of hospital stay according to burn type. There was no significant difference in the number of operations according to burn type. When the relationship between burn type and length of hospital stay was evaluated, it was found that the length of hospital stay was longer for scalding and flame burns compared to electrical burns.

Table I: Burn-related characteristics of the patients

Features associated with burns	n (%)
Sex	
Female	114(41.5)
Male	161(58.5)
Age Groups	
0-12 months	35 (12.7)
>12-24 months	86 (31.3)
>2-6 years	78 (28.4)
> 6-12 years	51 (18.5)
>12-18 years	25 (9.1)
Burn site	
Head and neck	35 (12.7)
Body	40 (14.5)
Upper extremity	85 (30.9)
Lower extremity	59 (21.5)
In more than one field	56 (20.4)
Type of burn	
Scalding	246 (89.5)
Electricity	7 (2.5)
Flame	21 (7.6)
Chemical	1 (0.4)

Table II: Information on burn type and age at onset

Type of burn	Mean Age ± SD (year)
Scalding	3.47± 0.24
Electricity	7.14±2.38
Flame	10.61±0.92

Table III: The relationship between burn type and burn percentage, mean number of operations, and total length of stay in ward or intensive care unit

	Scalding	Electricity	Flame	Total	p
TBSA Percentage*	8 (1-40) ^a	1 (1-3) ^b	9 (2-60) ^a	8 (1-60)	0.001
Number of Operations*	0 (0-16)	0 (0-5)	0 (0-14)	0 (0-16)	>0.050
Hospitalization Period (day)*	7 (1-38) ^a	3 (1-7) ^b	9 (1-40) ^a	7 (0-40)	<0.050
Intensive Care Duration (days)*	0 (0-42) ^a	0 (0-1) ^{ab}	0 (0-57) ^b	0 (0-57)	0.001
Total Hospital Stay (days)*	8 (1-58) ^a	4 (1-7) ^b	9 (1-86) ^c	8 (1-86)	<0.050

*Median(min-max), **TBSA:** Total Body Surface Area

While there was a significant correlation between the percentage of TBSA and the duration of intensive care unit stay and hospitalization ($p=0.001$), the number of surgeries increased as the percentage of burns increased ($p=0.072$).

One of the children who participated in the study was a 13-year-old child with epilepsy and mental retardation, and the TBSA was scalding with a rate of 23%. The patient was followed for 4 days in the ward and 22 days in the intensive care unit and underwent 3 operations. A 24-month-old child diagnosed with haemophilia who had a scalding burn with a TBSA of 2% was discharged after two days in hospital without the need for

surgery. Apart from these two children, there were no patients with chronic diseases.

Pearson correlation analysis between total length of hospitalization and total body surface area affected by burns showed a positive correlation ($r: 0.683, p < 0.001$).

The median length of hospital stay was 7 (min-max:1-86) days for boys and 8 (min-max:1-58) days for girls. The median length of hospital stay was not statistically different between the sexes ($p=0.283$), according to the Mann-Whitney U-test. When examining the discharge patterns, it was found that 1 (0.4%) patient died, 261 (94.9%) patients were discharged and 13 (4.7%) patients left the hospital at the parents' request.

DISCUSSION

Burns in the pediatric age group represent a significant proportion of all burn cases. Accurate assessment of burn patients is both life-saving and important in determining treatment or surgical intervention. Although most burn cases can be treated outpatient, 5% are severe burns and require hospitalization (5,7-10). Burns involving more than 10% of the body surface area, burns to the hand, foot, face or perineum, electrical burns or chemical burns require hospitalisation (9).

Eskişehir City Hospital is one of the most important burn centres in the region, which also serves the surrounding provinces and has received the title of a burn centre in 2019. It is a center with 12 beds, 4 intensive care beds, 1 operating room, 1 hydrotherapy room and 2 dressing rooms, 1 outpatient polyclinic room, specialized personnel, a general surgeon who has received burn training and a pediatric surgeon who monitors pediatric cases.

When gender is considered in pediatric burns, several studies have shown that boys are more likely to suffer burns than girls(11-13). In our study, 58.5% of cases were male, which is consistent with the literature.

Pediatric burns usually occur in the home and the most common cause is scalding in Turkey (14-17). After scald burns, flame burns and electrical burns are the next most common types of burns in the pediatric age group (5,18,19). In our study, similar to the literature, scalds were the most common cause of burns, followed by flame and electrical burns.

Children are more susceptible to flame and electrical burns than other age groups. This is due to exposure during industrial work or play. In our study, scalding burns were observed in the younger age group, whereas electrical and flame burns were observed in the school-age group. This situation was similar to data from developing countries (9,20). Rapid growth and development and excessive mobility in infants aged 0-12 months are common causes of scalds (21). Again, between the ages of 1 and 3, as motor skills develop, scalds from hot water and scalds from other foods can cause burns to the hands, feet

and trunk. In school-age children, flame and electrical burns are more common (22). During adolescence, flame, electrical and scalding burns are also seen as a result of starting to work in the home or as a result of increased physical activity and the young person's efforts to become independent (6).

In pediatric burn cases, the body surface area affected by burns varies, and it is known that mortality and hospital length of stay increase as the body surface area affected by burns increases (5,23-25). In our study, the mean body surface area of the patients was found to be 8%, and it was found that the length of hospital stay increased as the body surface area ratio increased. In our study, the length of hospital stay and the number of surgeries increased as the percentage of TBSA increased.

Studies have reported burn mortality rates in pediatric patients ranging from 0.65% to 15.4%. Mortality increases with flame burns (5,26). The most common causes of mortality are acute renal failure, sepsis, shock and disseminated intravascular coagulation (5,17-19, 27-30). In our study, 1 patient (0.4%) died, which is lower than the rates reported in the literature. The mortality rate was so low in our study because there were not many burn patients with a large body surface area affected by burns and not many patients who required intubation.

In conclusion, similar to the literature, burns were more common in males and the most common cause was scalding. In this study, burns were mostly observed in children aged 0-24 months, and these burns can be reduced by ensuring that parents pay more attention to this issue for this age group and by organising the home environment and living spaces. Electrical burns were more common in the school age group and were low voltage injuries. Flame burns are seen in older age groups. Burns can have more serious consequences in pediatric cases. By examining the categories of burns in pediatric patients by age group, we believe that burn cases in this age group can be reduced by raising parental awareness and instituting preventative measures.

REFERENCES

- Gündüz M. Konya Bölgesinde Çocuk Yanıkları ve Özellikleri, Zeynep Kamil Tıp Bülteni 2017;48:80-3.
- Shah AR, Liao LF. Pediatric Burn Care: Unique Considerations in Management. Clin Plas Surg 2017;44:603-10.
- Gülhan B, Kanık Yüksek S, Hayran M, Parlakay Özkaya AN, Güney D, Akın Kağızmanlı G, et al. Infections in Pediatric Burn Patients: An Analysis of One Hundred Eighty-One Patients. Surg Infect (Larchmt) 2020;21:357-62.
- Al-Hajj S, Pike I, Oneissi A, Zheng A, Abu-Sittah G. Pediatric Burns Among Refugee Communities in Lebanon: Evidence to Inform Policies and Programs. J Burn Care Res 2019;40:769-75.
- Öztorun Cİ, Demir S, Azılı MN, Şenaylı A, Livanelioğlu Z, Şenel E. The outcomes of becoming a pediatric burn center in Turkey. Ulus Travma Acil Cerrahi Derg 2016;22:34-9.
- Aliosmanoğlu Ç, Aliosmanoğlu İ, Kapan M, Böyük A ve Önder A. Yanık yoğun bakımda elektrik çarpması nedeniyle izlenen çocukların takip ve tedavi sonuçları. Dicle Tıp Dergisi 2011;38:170-3.
- Goldstein B, Giroir B, Randolph A; International Consensus Conference on Pediatric Sepsis. International pediatric sepsis consensus conference: Definitions for sepsis and organ dysfunction in pediatrics. Pediatr Crit Care Med 2005;6:2-8.
- Weed RO, Berens DE. Basics of burn injury: implications for case management and life care planning. Lippincotts Case Manag 2005;10:22-9.
- Senel E, Yasti AC, Reis E, Doganay M, Karacan CD, Kama NA. Effects on mortality of changing trends in the management of burned children in Turkey: eight years' experience. Burns 2009;35:372-7.
- Kaya ZI, Bilgin C, Ermis SS, Bilgin T, Bildirici Y, Kaya BY. According to the Burn Type of the Patients Followed in the Burn Intensive Care Unit Ast, Alt and Cpk Levels and Treatment Process. Eskisehir Med J2023;4:134-9.
- Soleimani T, Evans TA, Sood R, Hartman BC, Hadad I, Tholpady SS. Pediatric burns: Kids' Inpatient Database vs the National Burn Repository. J Surg Res 2016;201:455-63.
- Moehrlen T, Szucs T, Landolt MA, Meuli M, Schiestl C, Moehrlen U. Trauma mechanisms and injury patterns in pediatric burn patients. Burns 2018;44:326-34.
- Kazanasmaz O, Dinç N. Clinical Evaluation of Pediatric Age Group Patients Followed in Burn Unit. J Harran Univ Med Fac 2019;16:535-9.
- Ciftçi I, Arslan K, Altunbaş Z, Kara F, Yılmaz H. Epidemiologic evaluation of patients with major burns and recommendations for burn prevention. Ulus Travma Acil Cerrahi Derg 2012;18:105-10.
- Arslan H, Kul B, Derebaşınloğlu H and Çetinkale Oğuz. Epidemiology of pediatric burn injuries in Istanbul, Turkey. Ulus Travma Acil Cerrahi Derg 2013;19:123-6.
- Anlatici R, Ozerdem OR, Dalay C, Kesiktaş E, Acartürk S, Seydaoğlu G. A retrospective analysis of 1083 Turkish patients with serious burns. Burns 2002;28:231-7.
- Sakallioğlu AE, Başaran O, Tarım A, Türk E, Kut A, Haberal M. Burns in Turkish children and adolescents: nine years of experience. Burns 2007;33:46-51.
- Kut A, Basaran O, Noyan T, Arda IS, Akgün HS, Haberal M. Epidemiologic analysis of patients with burns presenting to the burn units of a University Hospital Network in Turkey. J Burn Care Res 2006;27:161-9.
- Türegün M, Sengezer M, Selmanpakoglu N, Celiköz B, Nişancı M. The last 10 years in a burn centre in Ankara, Turkey: an analysis of 5264 cases. Burns 1997;23:584-90.
- Thombs BD, Singh VA, Milner SM. Children under 4 years are at greater risk of mortality following acute burn injury: evidence from a national sample of 12,902 pediatric admissions. Shock 2006;26:348-52.
- Vural F and Özer Özlü NG. Recommendations of The Current Guidelines for Burn Care. J Educ Res Nurs 2020;17:187-93.
- İnce T, Yalçın SS ve Yurdakök K. Çocukluk çağında ciddi kaza sıklığı ve risk faktörleri. Çocuk Sağlığı ve Hastalıkları Dergisi 2014;57:173-82
- Ghorbel I, Bouaziz F, Loukil K, Moalla S, Gassara M, Ennouri K. Epidemiological profile of burns in children in central and southern Tunisia: A 67-case series. Arch Pediatr 2019;26:158-60.
- Tegtmeyer LC, Herrnsstadt GR, Maier SL, Thamm OC, Klinke M, Reinshagen K, et al. Retrospective analysis on thermal injuries in

- childrenDemographic, etiological and clinical data of German and Austrian pediatric hospitals 2006-2015-Approaching the new German burn registry. *Burns* 2018;44:150-7.
25. Li H, Wang S, Tan J, Zhou J, Wu J, Luo G. Epidemiology of pediatric burns in southwest China from 2011 to 2015. *Burns* 2017;43:1306- 17.
26. Düzgün AP, Senel E, Ozmen MM, Kuluçođlu H, Işık Y,Coşkun F. The evaluation of the patients admitted to a burn center in Turkey. *Ulus Travma Acil Cerrahi Derg* 2003;9:250-6.
27. Kobayashi K, Ikeda H, Higuchi R, Nozaki M, Yamamoto Y, Urabe M, et al. Epidemiological and outcome characteristic of major burns in Tokyo. *Burns* 2005; 31 Suppl 1:3-11
28. Akerlund E, Huss FR, Sjöberg F. Burns in Sweden: an analysis of 24,538 cases during the period 1987-2004. *Burns* 2007;33:31-6.
29. Aldemir M, Kara IH, Girgin S, Gülođlu C. Factors affecting mortality and epidemiological data in patients hospitalised with burns in Diyarbakir, Turkey. *S Afr J Surg* 2005;43:159-62.
30. Thombs BD, Singh VA, Milner Sm. Children under 4 years are at greater risk of mortality following acute burn injury: evidence from a natinal sample of 12,902 pediatric admissions. *Shock* 2006;26:348-52.