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ORIGINAL ARTICLE

Pediatric Burns and the Leading Factors of Burn Injury

Pediatrik Yanıklar ve Yanık Yaralanmalarının Önde Gelen Etkenleri

[1]Abdulkadir Başaran, [1]Özer Özlü

[1]Adana Şehir Eğitim ve Araştırma Hastanesi Genel Cerrahi A.B.D., Yanık Merkezi, Adana

Correspondence

Abdulkadir Başaran, Adana Şehir Eğitim ve Araştırma Hastanesi Genel Cerrahi A.B.D., Yanık Merkezi, Adana

E-Mail: adkbasar@yahoo.com

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ABSTRACT

Objective: Burn trauma is an important health problem especially in children who are the most affected group as they are not fully capable of protecting themselves from injuries. The aim of this study is to present the clinical features of preschool pediatric burn patients treated in our tertiary burn center and highlight the main factors leading to burn injury.
Material and Methods: A total of 123 preschool-aged patients who were hospitalized in our burn center between 1 January 2021 and 30 June 2021 were included in this cross-sectional study. Burn etiology and the environmental factors leading to burn injury were obtained from face to face interviews with parents of the children. Demographic and clinical data of the patients were recorded.
Results: The mean age of the study population was 2.40±1.3 years. The etiology of burn was mainly scalds (%87.8). Flame (10.6%) and electrical (1.6%) burns were less common in this age group. Among the patients 81 (%65.9) of them were living in urban area, 32 (%26) in rural area and 10 (%8.1) in tents or refugee camps. The household population was 5.53±2.3 person. In most of the cases, the children were not alone (%84.6) during the burn injury and in %54.5 of cases the kitchen was the place of injury.
Conclusion: Overcrowded conditions were prominent in the environment in which the patients lived. Although there was an adult nearby at the time of injury there was lack of supervision by the caregiver. The burns are likely to occur in the kitchen where unsafe cooking and dining on the floor takes place. Therefore kitchen safety should be ensured first and other home security measures should be taken in order to prevent pediatric burns.

Key words: Burns; pediatric patients; preschool age; environmental factors

ÖZ

Amaç: Yanık yaralanmalarından en çok etkilenen grup çocuklardır. Çocuklar yaralanmalardan kendilerini koruyamadıkları için bu yaş grubunda yanıklar önemli bir sorun olarak karşımıza çıkmaktadır. Bu çalışmanın amacı, üçüncü basamak yanık merkezimizde tedavi edilen okul öncesi pediatrik yanık hastalarının klinik özelliklerini sunmak ve yanık yaralanmasına yol açan faktörleri vurgulamaktır.
Gereç ve Yöntem: Kesitsel bir araştırma olarak planlanan bu çalışmaya 1 Ocak 2021 ile 30 Haziran 2021 tarihleri arasında merkezimizde yatarak tedavi edilen okul öncesi yaştaki 123 hasta dahil edildi. Hastaların demografik ve klinik verileri kaydedildi. Yanık yaralanmasına neden olan çevresel faktörler ve yanık etiyolojisi ile ilgili bilgiler çocukların aileleri ile yüz yüze yapılan görüşmelerden elde edildi.
Bulgular: Çalışma grubunun yaş ortalaması 2,40±1,3 yıl idi. Yanık etiyolojisi olarak en sık neden haşlanma (%87,8) olarak tespit edildi. Bu yaş grubunda alev (%10,6) ve elektrik (%1,6) yanıkları daha az sıklıkta görüldü. Hastaların 81'i (%65,9) kentsel, 32'si (%26) kırsal alanda ve 10'u (%8,1) çadır veya mülteci kamplarında yaşıyordu. Hane halkı nüfusu 5,53±2,3 kişi olarak bulundu. Yanık yaralanması sırasında çocuklar çoğunlukla tek başına değildi (%84,6) ve en fazla yaralanma yeri mutfaktı (%54,5).
Sonuç: Hastaların yaşadığı ortamda aşırı kalabalık koşullar belirgindi. Yaralanma anında çocuğun yakınında bir yetişkin olmasına rağmen gözetim eksikliği mevcut idi. Yanıkların çoğu emniyetsiz yemek pişirme ve yer sofrasında yemek yeme alışkanlığının olduğu mutfak ortamında meydana gelmektedir. Bu nedenle pediatrik yanıkların önlenmesi için öncelikle mutfak güvenliği sağlanmalı ve diğer ev güvenlik önlemleri alınmalıdır.

Anahtar kelimeler: Yanık; çocuk hastalar; okul öncesi yaş; çevresel faktörler

Introduction

Children are the group most at risk for burn injuries. Burns are the fifth most common cause of non-fatal childhood injuries worldwide (1). Children under the age of 5 constitute 1/3 of burn cases (2) Burns mostly affect the citizens of middle and low-income countries (2,3) On the other hand, it is reported that children account for almost half of all burn cases in hospitals of developed European countries (4). It is estimated that there are 100,000 child burns annually in the United States (5). Ultimately, although most burns occur in low- and middle-income countries, there is risk of burn injury in all countries and children are the most affected (6).

Features such as the education level and economic status of the family, living conditions and the number of people living together are the factors that have an impact on the formation of burn injuries (7-10). The high incidence of burns in preschool children has been attributed to the lack of motor coordination during development, their curiosity to know the environment and being active (11). The high incidence rate of burn injuries in an age group who is under the supervision of adults makes it necessary to examine the environment where these injuries occur.

Most of the burn injuries under the age of six are scald burns caused by the destruction of some or all of the cells in the skin or other tissues by hot liquids (6,12,13). Hot water is the main cause of scalding, followed by tea, milk, oil, soup and other liquids (13,14). Burn injuries

cause prolonged hospital stay, deformity and disability (1,12). Pediatric burns also create a socioeconomic burden on the family by affecting mental health and quality of life (15,16).

Effective strategies are needed to reduce burn injuries, many of which are preventable. The high mortality, disability and deformity rates seen after burns can be reduced by economical and sustainable methods in burn prevention and care (17). True identification of the problem is considered the main component of planning effective interventions. Epidemiological and clinical data are important to fully define the population at risk and to recommend appropriate preventive measures (18). The aim of our study is to present the clinical features of burns seen in preschool children treated in our burn center, to examine the environmental factors that cause burn injury and to suggest preventive measures.

Materials and Methods

A total of 123 pediatric patients under the age of 6 who were hospitalized in our burn center between January 1, 2021 and June 30, 2021 were evaluated in this cross-sectional study. Demographic, socio-economic and clinical data of the patients were recorded. Information about environmental factors causing burn injury, burn etiology and first aid practices were obtained by face-to-face interviews with families. The percentage of burned total body surface area (TBSA) of the patients was evaluated, and the length of hospital stay was recorded.

This study was approved by the Clinical Research Ethics Committee of our institution and written informed consent was obtained from all participants (Decision No: 379/14.04.2021).

"Statistical Package for Social Sciences 22.0 for Windows" was used for data analysis. Results were expressed as mean±SD (Standard Deviation) and median (min-max), n, and percent (%).

Results

A total of 123 (44.7%) pediatric patients under the age of 6 out of 275 patients who were hospitalized in our burn center during the study period were included in the study. Of the patients, 65 (52.8%) were male and 58 (47.2%) were female. The mean age of the patients was 2.40±1.3 years. The percentage of burned total body surface area (TBSA) of the patients was 12.19±6.4 and the length of hospital stay was 15.49±9.7 days. In our study group, scald burns (87.8%) were the most common etiology. Flame burns (10.6%) and electrical burns (1.6%) were less common. Demographic and clinical data of the patients are presented in Table 1.

Table 1. Demographic and clinical variables of the patients

	Patients (n=123)
Age (year)	2.40±1.3 2.0 (0.5-6)
Gender (M/F)	65/58
TBSA (%)	12.19±6.4 11.0 (2-31)
Hospital Stay (day)	15.49±9.7 13.0 (1-42)
Burn Etiology n (%)	
Water	29 (23.6)
Tea	37 (30.1)
Meal	26 (21.1)
Milk	16 (13.0)
Fire	16 (10.6)
Electricity	2 (1.6)

M/F: Male/Female, TBSA: Total Body Surface Area

The average household population in the environment where the patients lived was 5.53±2.3 people. Of the patients, 81 (65.9%) lived in urban areas, 32 (26%) in rural areas, and 10 (8.1%) in tents or refugee camps. The heating source was wood or coal stove in 106 patients (86.2%). The heating source was located in the living room in 74 patients (60.2%). In 38 patients (30.9%), it was located in the hall and the hall was used as a daily living area. The living conditions of the patients are summarized in Table 2.

While 11.8% (n=27) of the parents were uneducated, the higher education rate was 9.8% (n=12). 73.2% of the families had an income at or below the minimum wage. The most common occupations were agriculture and construction works (28.5% and 22.0%). Educational and economic data of the patient families are summarized in Table 3.

Table 2. Environmental living conditions of the patients

	Patients (n=123)
Place of Living n (%)	
Urban Area	81 (65.9)
Rural Area	32 (26)
Tent/Refugee Camp	10 (8.1)
Average Room Number	3.20±1.1 (1-5)
Household Population	5.53±2.3 (3-15)
Source of Heating n (%)	
Wood/Coal Stove	106 (86.2)
Electric Stove	6 (4.9)
Central Heating	9 (7.3)
Air Conditioning	2 (1.6)
Place of Heat Source n (%)	
Living Room	74 (60.2)
Saloon	38 (30.9)
Other (Central Heating/Air Conditioning)	11 (8.9)
Dining Place (On Floor/Table)	59/64

Table 3. Educational and economic data of patients' families

	Families (n=123)
Educational Status (M/F)	
Illiterate	17/12
Literate	16/4
Elementary	34/36
Secondary	42/36
High School	12/25
University	2/10
Status of Wage	
No regular wage	22
Below Minimum Wage	27
Minimum Wage	41
Above Minimum Wage	33
Occupational Status n (%)	
Agricultural Worker	35 (28.5)
Construction Worker	27 (22.0)
Own Job	12 (9.7)
Textile Worker	10 (8.1)
Service Industry Worker	9 (7.3)
Not Employed	9 (7.3)
Officer	8 (6.5)
Others	13 (10.6)

M/F: Mother/Father

Table 4. Data regarding the injury scene

	Patients (n=123) n %
Place of Injury	
Kitchen	67 (54.4)
Living Room	31 (25.2)
Saloon	14 (11.4)
Outside	7 (5.7)
Bathroom	4 (3.3)
Person Nearby at Time of Injury	
Mother	76 (61.8)
Grandmother	16 (13.0)
Father	12 (9.7)
Alone	19 (15.5)
Type of First Treatment	
Cooling with water	94 (76.4)
No treatment	11 (8.9)
Tooth paste	7 (5.8)
Others	11 (8.9)

Burn injuries mostly occurred in the kitchen and living room (54.5% and 25.2%, respectively). One of the parents was close to the child at the time of injury in 71.5% (n=88) of the patients. Only in 15.5% of the patients there was no one nearby at the time of injury. The first treatment was administered by the mother in 71.5% of the patients. Water cooling was applied to 76.4% of the patients in the first treatment, but the application time was not long enough in most of them. Data regarding the environment at the time of burn injury are summarized in Table 4.

Discussion

Research on the environment and conditions in which burn victims live is important for the development of effective prevention approaches and for improving their living conditions. These studies are also important in terms of raising awareness in the international

community by drawing attention to the problems. Our burn center is a tertiary center that serves patients from the south and southeast of our country and from neighboring countries, primarily Syria. In this study, we presented our data in order to draw attention to the role of environmental factors on childhood burns.

In developed countries, burn prevention studies have been shown to be effective in reducing burn morbidity, mortality and hospital stay (17,19). Since the treatment of burn victims is difficult and expensive, prevention efforts are more important. Our country was examined among low- or middle-income countries in a review on the descriptive epidemiology, risk factors, treatment and prevention of burns (3). The many studies discussed in this review have shown that most burns occur in children younger than 4 years old. The mean age of 123 burn patients in our study was found to be 2.40±1.3 years. The high number of burns in infants and pre-school children has been attributed to lack of motor coordination, curiosity about knowing the environment, and being active during their development (11). Our patients in the preschool age group comprised 44.7% of the 275 patients in all age groups who were hospitalized during the study period. Burned TBSA and length of hospital stay data of our study were also found to be compatible with the literature. The most common etiology was scalding with hot water, tea or other liquids (87.8%). Flame burns were seen in 16 patients (10.6%), while only 2 patients (1.6%) were hospitalized with the diagnosis of electrical burns. Etiological data of this age group show similar characteristics in current publications (7,20-22).

While the average household size in the European Union was 2.3 in 2016, it was 3.5 in Turkey (23). In our study, the average household population was found to be 5.53±2.3. It is clear that our patients live in above-average crowded conditions. It has also been shown in different publications that crowded living conditions pose a risk for burning (8,9,24). In our country, common life in the form of an extended family is common with the effect of culture, especially in families with limited economic opportunities. The heat source is placed where the family eats, sits and drinks tea together, or even sleeps together. The wood stove is suitable for a two-piece teapot that keeps the tea hot and ready. In addition, it is a common situation to eat together on the floor next to the stove. Cooking on the floor using a picnic tube, using common areas for cooking, using large pots for traditional cooking, and sterilizing milk by boiling are some other factors that cause burns in the kitchen (11,20). Inadequate supervision of children by adults is also one of the leading factors in burns. These factors can be seen in poorer segments of the society in developed countries as well (25).

There were no burn victims among our patients as a result of a refugee camp fire but there are reports in the literature about refugee camp fires as a result of poor planning and crowded settlements (26,27). In the literature, education and prevention programs are recommended to reduce pediatric burns (25,28). Unfortunately, unless the living conditions are improved, the benefit will be limited.

Conclusion

In conclusion, our findings show that most of the patients have low socio-economic status and overcrowded living conditions. In a house where a pre-school child lives, kitchen safety should be provided first. Other home security measures should be taken as well (there should be a safety barrier around the stove, no liquid-filled container should be left on it, no food should be eaten on the floor table, etc.).

The majority of pediatric burn accidents occur at home and when an adult is nearby. Child neglect is one of the important issues that cause burn accidents. In the evaluation of patients, special attention should be paid to signs of neglect as well as general protective measures.

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