




A rare type of burn : Nylon burns

Yasemin Demir Yiğit¹ , Ebral Yiğit² , Ahmet Çınar Yastı³ 

¹ Clinic of Pediatrics, Gazi Yaşargil Training and Education Hospital, Diyarbakır, Türkiye

² Burn Center, Gazi Yaşargil Training and Education Hospital, Diyarbakır, Türkiye

³ Clinic of General Surgery, Ankara City Hospital, Ankara, Türkiye

ABSTRACT

Objective: In this study, it was aimed to examine nylon burns in paediatric patients and compare the results with other causes of hot object contact burns.

Material and Methods: A 10-year retrospective study was conducted on 77 paediatric patients hospitalized for hot body burns at Gazi Yaşargil Training and Research Hospital Burn Center.

Results: Of those patients with hot body burns, 72.7% (n= 56) were males and 27.3% (n= 21) were females. Male-to-female ratio was 2.67:1. Mean age of the patients was 4.79 (min= 1, max= 16) years. There were 42 patients who applied to our hospital on the day of their burn, while four patients applied one day after the burn, one patient applied two days after the burn, 13 patients applied three days after the burn and 17 patients applied five days after the burn. Most burns (79.3%) were third-degree burns, whereas 19.5% were second-degree and 1.2% were fourth-degree burns. The most common causes of hot body burns were hot nylon and hot stoves, followed by hot ash and hot irons. The number of nylon burns was the highest in the summer and the highest number of hot stove burns occurred in the winter. Nylon burns were most common in the three to eight age group and then gradually decreased. The highest burn rate was observed in nylon burns.

Conclusion: The most common cause of all burns in the Turkish paediatric population is scalding. Although nylon burns are rare, they draw attention due to their higher burn degrees.

Keywords: Nylon burns, hot object contact burns, pediatric burns, epidemiology

INTRODUCTION

Burns are events causing serious material and morale problems that can lead to death and disability. Despite medical and technological advances, burns are still a serious, lifethreatening problem. For this reason, the cheapest and most effective method to prevent burns is by taking precautions before they occur.

Hot object contact burns are caused by direct contact with a hot material, such as hot metal, a stove or an iron, or by being unprotected due to immobilization as a result of various neurological illness for a long time. Burns usually occur in limited areas and may occur at various depths. Nylon is a substance used in all areas of our lives. This material burns rapidly, shrinks and catches fire. After being ignited, the material slowly burns and melts. Nylon extinguishes itself, but can drip dangerously, stick to the site where it drips, and continue to burn until it drains (1).

The aim of this study was to investigate hot body contact burns in patients and compare nylon burns with other contact burns as described in the literature.

MATERIAL and METHODS

Study Design

This 10-year retrospective study was conducted on 77 paediatric patients with hot object contact burns who were admitted to the Gazi Yaşargil Training and Research Hospital Burn Center between January 2010 and January 2020. The study was approved by Research Ethics Committee (Gazi Yaşargil Training and Research Hospital Ethics Committee/29.01.2021/E-615).

Study Parameters

The American Burn Association admission criteria were applied to all patients presenting to our department. Patients' medical histories were taken to reveal the ae-

Cite this article as: Demir Yiğit Y, Yiğit E, Yastı AÇ. A rare type of burn : Nylon burns. Turk J Surg 2022; 38 (2): 202-207.

Corresponding Author

Ebral Yiğit

E-mail: ebralyigit@gmail.com

Received: 11.05.2021

Accepted: 08.06.2022

Available Online Date: 29.06.2022

© Copyright 2022 by Turkish Surgical Society Available online at www.turkjsurg.com

DOI: 10.47717/turkjsurg.2022.5373

tiology of the hot body contact burn. Medical records of each patient were reviewed, and demographic characteristics, burn depth, total burned body surface area (TBSA), the duration of their hospital stay, treatment methods, and rates of morbidity and mortality were determined.

General Management of Pediatric Burn Cases

The overall management of pediatric burn cases includes the same immediate concerns for life support as for any other trauma patient: Establishing an open airway, initiating adequate volume resuscitation to stabilize circulation, and evaluating additional injuries. The patient is then followed up in a specialized burn center with a well-trained multidisciplinary team under the leadership of a burn surgeon.

Statistical Analysis

Descriptive statistics for continuous variables were presented as mean and standard deviation, while count and percentages for categorical variables. SPSS (Chi. III. USA) statistical program was used for all statistical computations.

RESULTS

The patient group was comprised of 72.7% (n= 56) males and 27.3% (n= 21) females. Male-to-female ratio was 2.67:1. Mean age of the patients was 4.79 (min= 1, max= 16) years. There were 42 patients who applied to our clinic on the day of the burn, four patients one day after the burn, one patient two days following the burn, 13 patients applied three days after the burn and 17 patients applied five days after the burn. Third-degree burns made up 79.3% of all burns, while 19.5% were second-degree and 1.2% was fourth-degree burns (Table 1).

The most common causes for burns were hot nylon and hot stoves, followed by hot ash and a hot iron (Figure 1). The anatomical areas with the most burns were the left upper extremity, followed by the right lower extremity and then the right upper extremity (Figure 2).

The highest burn injury rate was seen in patients in the 0-2 age group (n= 4; 44.1%), with the highest rate in the 0-1 age group (23.3%). After the age of four years, the number of patients gradually decreased.

Table 1. General information about the patients

	Number	Percent
Boy	56	72.7%
Girl	21	27.3%
Age	1-16 years mean= 4.79 ± 4.2	
Burn degree		
2 nd degree	15	19.5%
3 rd degree	61	79.2%
4 th degree	1	1.3%
Burn percentage	1-15%	Mean= 3.9 Std= 2.6
Hospital length of stay	1-15 days	Mean= 3.86 Std= 2.6

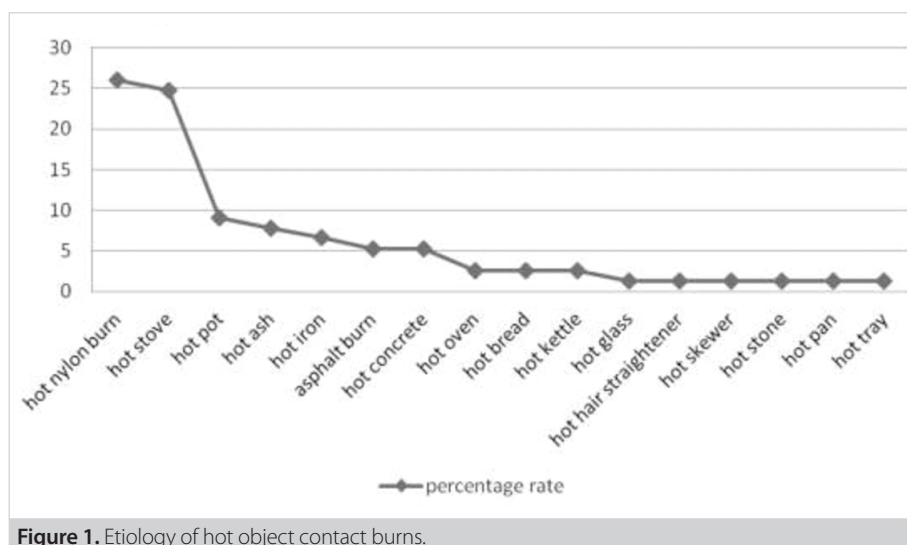


Figure 1. Etiology of hot object contact burns.

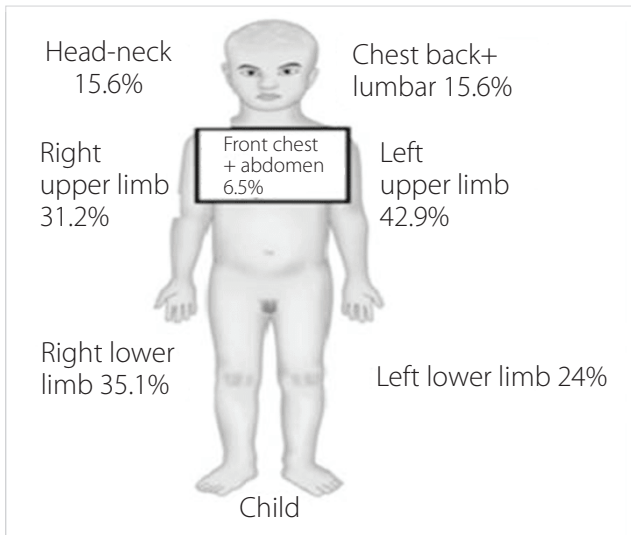


Figure 2. Percentage of area affected by hot object contact burn.

Nylon burns accounted for 25.9% of all burns and were most common between the ages of 3-8 years and then gradually decreased (Figure 3). Nylon burns were the highest during the summer. Of the patients, 25% had second degree burns, and 75% had third degree burns. Wound culture results were 10% (+) in nylon burns (Table 2). There was no additional disease in nylon burns.

Hot stove burns accounted for 24.7% of all patients and were most common between the ages of 0-2 years and then gradually decreased (Figure 3). Hot stove burns were the highest during the winter. Of the patients, 31.5% had second degree burns, and 68.5% had third degree burns (Table 2). Wound culture results were 15.7% (+) in hot stove burns. Two (10.5%) patients with hot stove burns also had meningomyelocele as additional disease.

Most of the patients were admitted during the summer months (Figure 4). Approximately 6.5% of the patients had a meningomyelocele and 1.3% had paraplegia as additional diseases.

With regard to patients' homes, 62.3% came from urban centres and 37.7% were from rural areas.

Wound culture result was positive in 23.4% of the patients. The most abundant microorganism was *Staphylococcus aureus* with 5.2%. Antibiotics were given according to the culture results.

Silver nitrate dressing was covered after escharectomy in 97.4% of the patients, and grafting was performed in 1.3% of the patients. In 1.3% of the patients, the wound was closed by turning the skin flaps.

The average length of stay of the patients ranged from one to 15 days, with an average of 3.86 ± 2.62 days. We did not have any patients who received an amputation or any that subsequently died following their injuries.

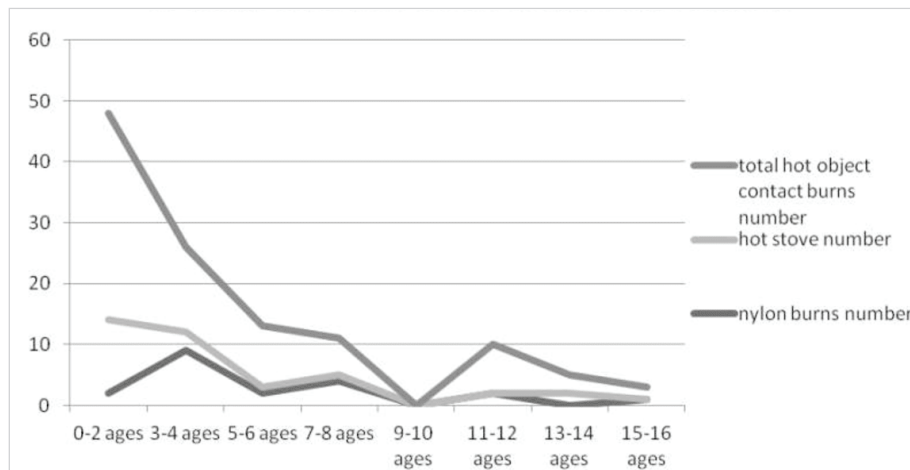


Figure 3. Distribution of the numbers of hot nylon, hot stove and total hot object contact burns by ages.

Table 2. Comparison of children's hot object contact burns

	Patient Percentage	2 nd Degree Patient Percentage	3 rd Degree Patient Percentage	Infection Rate
Hot Nylon	25.9%	25.0%	75.0%	10.0%
Hot Stove	24.7%	31.5%	68.5%	15.7%
All Patients	100%	19.5%	72.9%	23.4%

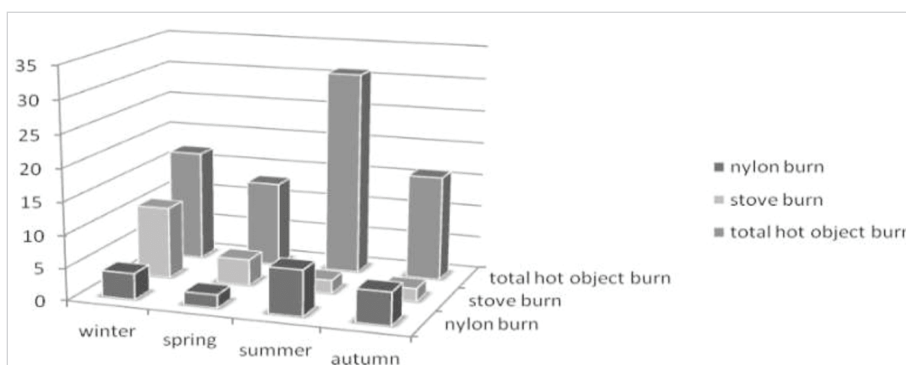


Figure 4. Seasonal distribution of inpatients by hot object contact burns.



Figure 5. Children who stubble.

DISCUSSION

Contact burns with hot objects are burns caused by direct contact of the skin with hot objects. It has been reported that contact combined with the sudden withdrawal reflex is usually short term, and the burn is limited but tends to be deep. These burns have also been found to be the second most common type of burn in various studies (2,3). It has been emphasized that such burns are more common in young children and people with restricted movements, as the contact time may be longer (3). Consistent with our study, some studies have reported a higher incidence of burns in males than in females (4,5).

Paediatric burn injuries affect low-and middle-income countries more than high-income countries (6,7). Hot object contact burns occur more in rural areas than in urban centres (7). Rural houses in Diyarbakır consist of one or two rooms at most, and they usually do not have a separate kitchen. This makes it

difficult for children to be effectively protected from the burn hazards associated with cooking. For instance, in Diyarbakır, the urban population is 72.9% and the rural population is 27.1% (8). Of the patients in our study, 62.3% came from the city centre and 37.7% from rural areas. However, in comparing the percentages, there was a higher rate of hot object contact burns in rural areas than in urban areas.

Our results were consistent with those of Kemp et al. (9). In addition, the causes of burns, such as hot nylon, hot tiles, hot concrete and hot soils, which are common in our region, can be added to hot contact burns. Unlike previous studies, contact burns are a common cause of burns in children under five years of age (9-12).

In our region, air temperatures are higher in the summer with longer periods of daylight, during which the temperature is at its highest. Air temperatures reach as high as 40-45°C (13). High temperatures and longer days inevitably increase the temperature of materials, such as soil, tiles and concrete. As a result, hot object contact occurs unavoidably and causes an increase in the proportion of hot objects in the summer. In our region, with a low socioeconomic level, rural children are usually barefoot. This may be one of the reasons for the high rate of hot object burns in the lower extremities in our region (Figure 5). Nylon burns are a rare type of burn in children. In our study, it was the most common cause of hot body burns between the ages of 3-8 years. The reason for this is that children coming from rural areas often burn unwanted dry grass for planting after the summer. They perform this task by traversing the field and by taking advantage of the drip feature of burning nylon to burn the whole field. Inevitably, this sometimes causes accidents and nylon burns occur (Figure 5).

People with low socioeconomic levels use nylon-made textiles a lot. Any kind of burning nylon suit sticks to the body. This increases the depth and complications of the burn. The government and the textile industry both need to investigate the problems associated with burnt and combustible fabrics (14). Two of our patients were burned in this way. Their treatment

was difficult, and their hospitalization periods were long. In our results, we had a higher rate of third-degree burns due to the dripping of hot nylon adhering to the skin.

The author argued that although home safety education with the provision of home safety equipment is effective in increasing some thermal injury prevention practices, there is insufficient evidence to determine whether this also reduces injury rates (15). In our study, we found that hot object contact burns are not only related to household items. Moreover, environmental and socioeconomic factors were found to be related with hot object burns.

CONCLUSION

Our study supports previous findings that contact burns are common thermal injuries in children under 16 years of age. This highlights the need for more prevention strategies for the most common hot object contact burns, which are caused by hot nylon, hot stoves, ash and irons. The causes of hot object contact burns vary in relation to the socio-cultural and consumer lifestyle of the society. Families should be made aware of hot nylon and other causes of burns. The government and the textile industry also need to make adjustments for the amount of nylon used in fabrics.

Ethics Committee Approval: This study was approved by Health Sciences University Gazi Yaşargil Training and Research Hospital Clinical Research Ethics Committee (Decision no: 615, Date: 29.01.2021).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - E.Y.; Design - E.Y.; Supervision - E.Y.; Data Collection and/or Processing - E.Y.; Analysis and/or Interpretation - E.Y.; Literature Search - Y.D.Y.; Writing Manuscript - Y.D.Y.; Critical Reviews - E.Y.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Azahari BM, Suzuki M, Masuda W, Hamidon BS, Azwan BS, Nizam B. et al. Effect of synthetic material on angle dependency of flame spread behavior over combined fabric. *AIP Conf Proc* 2017; 1831(1): 020014. <https://doi.org/10.1063/1.4981155>
2. Keshavarz M, Javanmardi F, Mohammadi AA. A Decade epidemiological study of pediatric burns in south west of Iran. *World J Plast Surg* 2020; 9(1): 67-72.
3. Grossova I, Zajicek R, Kubok R, Smula MC. The treatment of palmar contact burns in children: A five-year review. *Ann Burns Fire Disasters* 2017; 30(1): 5-8.
4. Chavade C, Gupta T, Deshbhratar T K, Mahadik S, Baliarsing A.A. Clinicoepidemiological Study of Burns at a tertiary care hospital at Mumbai, India *IOSR Journal of dental and medical sciences (IORS-JDMS)* 2017;16:107-11.
5. Kubilius D, Smailytė G, Rimdeikienė I, Malcius D, Kaikaris V, Rimdeika R. Epidemiology of paediatric burns in Lithuania: focus on a vulnerable population exposed to the risk of scalds at home without hot tap water supply. *Burns* 2014; 40(3): 506-10. <https://doi.org/10.1016/j.burns.2013.07.012>
6. Sleet DA. The global challenge of child injury prevention. *Int J Environ Res Public Health* 2018; 15(9): 1921. <https://doi.org/10.3390/ijerph15091921>
7. Shi S, Yang H, Hui Y, Zhou X, Wang T, Luo Y, et al. Epidemiologic characteristics, knowledge and risk factors of unintentional burns in rural children in Zunyi, Southwest China. *Scientific Reports* 2016; 6(1): 1-7. <https://doi.org/10.1038/srep35445>
8. Diyarbakır Büyükşehir Belediyesi Available from: <https://www.diyarbakir.bel.tr/diyarbakir/genel-bilgiler/ilce-nufus.html>. (Accessed Date: 24 Nisan 2019).
9. Kemp AM, Jones S, Lawson Z, Maguire SA. Patterns of burns and scalds in children. *Arch Dis Child* 2014; 99(4): 316-21. <https://doi.org/10.1136/archdischild-2013-304991>
10. Tekin R, Yolbaş I, Selçuk CT, Güneş A, Ozhasanekler A, Aldemir M. An evaluation of pediatric burn patients over a 15-year period. *Ulus Travma Acil Cerrahi Derg* 2012; 18(6): 514-8. <https://doi.org/10.5505/tjtes.2012.75031>
11. Tan KT, Prowse PM, Falder S. Ethnic differences in burn mechanism and severity in a UK paediatric population. *Burns* 2012; 38: 551-5. <https://doi.org/10.1016/j.burns.2011.10.005>
12. Teo AI, Van As AB, Cooper J. A comparison of the epidemiology of paediatric burns in Scotland and South Africa. *Burns* 2012; 38(6): 802-6. <https://doi.org/10.1016/j.burns.2012.04.010>
13. Kaya A. Fırat havzasında bulunan bazı illerin sıcaklık ve nem modelleri. *JONAS* 2019; 2(1): 50-8.
14. Grant EJ. Burn injuries: Prevention, advocacy, and legislation. *Clin Plast Surg* 2017; 44(3): 451-66. <https://doi.org/10.1016/j.cps.2017.02.005>
15. Lonne B, Scott D, Higgins D, Herrenkohl TI (eds.) *Re-visioning public health approaches for protecting children*. Springer International Publishing 2019. <https://doi.org/10.1007/978-3-030-05858-6>



ORJİNAL ÇALIŞMA-ÖZET

Turk J Surg 2022; 38 (2): 202-207

Nadir görülen bir yanık türü: Naylon yanıkları

Yasemin Demir Yiğit¹, Ebral Yiğit², Ahmet Çınar Yastı³

¹ Gazi Yaşargil Eğitim ve Öğretim Hastanesi, Çocuk Sağlığı ve Hastalıkları Kliniği, Diyarbakır, Türkiye

² Gazi Yaşargil Eğitim ve Öğretim Hastanesi, Yanık Merkezi, Diyarbakır, Türkiye

³ Ankara Şehir Hastanesi, Genel Cerrahi Kliniği, Ankara, Türkiye

ÖZET

Giriş ve Amaç: Bu çalışmada, pediatrik hastalarda gözlenen naylon yanıklarının incelenmesi ve elde edilen sonuçların, diğer sıcak cisim yanık nedenleri ile karşılaştırılması amaçlandı.

Gereç ve Yöntem: Gazi Yaşargil Eğitim ve Öğretim Hastanesi Yanık Merkezinde sıcak cisim yanığı nedeniyle hastaneye yatırılmış 77 pediatrik hasta üzerinde 10 yıllık geriye dönük bir çalışma yapıldı.

Bulgular: Sıcak cisim yanıklarının %72,7 (n= 56) erkek ve %27,3 (n= 21) kızdı. Erkek/kız: 2,67:1 oranı vardı. Hastaların ortalama yaşları 4,79 (min= 1, max= 16) yıldı. 42 hasta yanık oluştuğu gün, dört hasta yanık oluştuktan bir gün sonra, bir hasta yanık oluştuktan iki gün sonra, 13 hasta yanık oluştuktan üç gün sonra, 17 hasta yanık oluştuktan beş gün sonra bize başvurmuştu. Yanıkların %79,3'si üçüncü derece %19,5'i ikinci derece ve %1,2'si dördüncü derece idi. Sıcak cisim yanık nedeni başında en çok sıcak naylon ve sıcak soba gelmekteydi ve daha sonra sıcak kül ve sıcak ütü gelir. Naylon yanıklarının sayısı yazın en yüksek sayıda, sıcak soba yanıklarının ise kışın en yüksek sayıda idi. Naylon yanıkları en çok 3-8 yaş aralığında görüldü sonra giderek azaldı. En yüksek yanık derecesi oranı naylon yanıklarında gözlemlendi.

Sonuç: Türk pediatrik popülasyonunda en sık görülen yanık nedeni haşlama yanığıdır. Naylon yanıkları nadir görülmekle beraber daha yüksek yanık dereceleri ile dikkat çekmektedir.

Anahtar Kelimeler: Naylon yanıkları, sıcak cisimle temas yanıkları, pediatrik yanıklar, epidemiyoloji

DOI: 10.47717/turkjsurg.2022.5373