

Epidemiological Study about Childhood Burns in the Burn Unit of Ain Shams University Hospitals

SHERIEN METWALLY SALAMA, M.D.; AMR MAHMOUD FAYED, M.D. and AHMED GADALLAH, M.Sc.

The Department of Plastic, Burn and Maxillofacial Surgery, Faculty of Medicine, Ain Shams University

Abstract

Background: Childhood burns in Egypt are a significant problem, especially in families of low socioeconomic status. These families live in overcrowded areas, which lack proper hygiene and tend to use kerosene stoves, which lack any safety measure.

Objective: The purpose of this study is to determine the epidemiological characteristics of burn incidents in children to provide fundamental knowledge for a preventative programme that would shield younger children from burns and older children from the risks associated with burn injuries.

Patients Methods, and Results: Over 28 months, 981 burnt youngsters were presented to the Ain Shams University burn unit. Boys were harmed at a proportionately higher rate than girls. The age range of 3 to 6 years was associated with an increase in the incidence. Scalds made up 52.8% of the cause of burns, with fire accounting for 35.6% of cases. Electrical and chemical burns accounted for 5 and 6.6% of cases, respectively. Fifty patients suffered from occupational accidents, highlighting a significant issue with youngsters from lower socioeconomic classes entering the workforce between the ages of 8 and 15. During the trial, 23 children (2.3%) passed away because of burns.

Conclusion: The epidemiological pattern of children's burns in our area needs to serve as the foundation for a comprehensive media campaign aimed at regulating and enhancing the safety of home items. The most significant finding of this study is that the percentage of childhood burns was rising. This cannot be solely attributed to seasonal variations and public awareness; rather, it is a sign of the risks to the pediatric population associated with low socioeconomic status, which forces both parents to work and leave the kids unsupervised for extended periods of time.

Key Words: Burn – Childhood – Epidemiology – Admission.

Ethical Committee: The Ethical Committee of the College of Medicine at Ain Shams University had approved the study Code: R00006379.

Disclosure: No conflict of interest.

Correspondence to: Dr. Ahmed Gadallah,
E-Mail: ahmed.gadallah93@gmail.com

Introduction

According to the World Health Organization (WHO) most recent data, burn injuries in East Mediterranean Region (EMR), Egypt is included; remain one of the leading causes of morbidity and mortality among all injuries [1].

A disproportionately high percentage of burn cases are children. Children's burn injuries are significantly influenced by socioeconomic circumstances in Cairo, one of the world's most populous cities [2].

Before implementing preventative measures, a thorough examination of the epidemiological characteristics in each community is necessary since the aetiopathological variables that lead to burn injuries vary throughout populations [3].

Aim of work:

The aim of this study is to gain a comprehensive understanding of the epidemiology of childhood burn injuries from (0-18 years) and analyses demography, an etiology, clinical pattern, and the outcome of pediatric burn injuries in Burn Unit Ain Shams University.

Additionally, to determine the age group most affected, the most typical causes of burns in kids and teens and assist in the development of a national injury prevention policy pertaining to burns in kids and teens.

Patients and Methods

Study design:

- **Study type:** Retrospective study.
- **Study setting:** Burn Unit of Ain Shams University.
- **Study period:** The duration of the study based on medical records availability will be collected from 1st of January 2021 to 30th of April 2023.

All children under 18 years of age who presented to the Burn Unit due to burn injuries during the study period.

*Data collection:**A- Inclusion criteria:*

According to policy of our burn unit in admission, the child with any of the following criteria will be included:

- 1- Children aged less than 18 years.
- 2- Children with TBSA >10%.
- 3- Localized deep burn of 2% TBSA or greater.
- 4- Facial burn.
- 5- Suspected inhalation injury.
- 6- Burns of the hand, feet, and perineum.
- 7- Chemical or electrical burns.

B- Exclusion criteria:

- 1- Patient above 18 years of age.
- 2- TBSA less than 10%.
- 3- Associated fractures.
- 4- Chronic illness.

Data abstraction:

We planned to create a uniform data abstraction form in order to gather data on the variables listed below:

- a- *Demographics:* Age, gender, socioeconomic status.
- b- *Burn characteristics:* Cause and type of burn, total body surface area, depth, severity, season and associated injuries.
- c- *Treatment received:* Initial management, surgical interventions, length of hospital stay.
- d- *Outcome:* Mortality, complications, functional and aesthetic outcomes.
- e- *Risk factors:* Document any available information on potential risk factors such as socioeconomic factors, child abuse, negligence, etc.

Data collection:

- a- *Medical records review:* Extract relevant information from patients' medical files, including admission notes, progress daily notes, surgical records, and discharge summaries.
- b- *Data entry:* Enter the collected data into a secure database for further analysis.

Ethical considerations:

- 1- Obtain Institutional Review Board (IRB) approval before accessing and analyzing medical records.
- 2- Ensure compliance with patient confidentiality and privacy regulations.
- 3- Anonymize the data during analysis to maintain patient privacy.

Data analysis:

- 1- Conduct descriptive analysis to determine the prevalence, mean age, gender distribution, burn causes, severity, etc.
- 2- Perform statistical analysis to identify potential risk factors using appropriate tests (e.g., Chi-square, logistic regression).
- 3- Compare the findings with existing literature on childhood burns to assess consistency.
- 4- Present the results in tables, graphs, and charts for better visualization.

Reporting:

- 1- Prepare a comprehensive report including the background, study objectives, methods, results, discussion, and limitations of the retrospective study.
- 2- Summarize the findings related to the incidence, causes, severity, and outcomes of childhood burns.
- 3- Provide recommendations for prevention strategies based on the study findings.
- 4- Submit the report to relevant authorities, scientific journals, and present the findings at conferences or seminars.

Limitations:

- 1- Limitations inherent to retrospective studies, such as potential missing data, selection bias, and confounding factors.
- 2- Reliability of data depends on the documentation quality within medical records.

First aid:

First assistance was administered to every burned patient at the burn unit's reception area. This involved applying sodium fucidate ointment (Fucidin) to the wound and cooling the burnt region. In addition to securing respiration, patients who required admission were first handled in the resuscitation room where an intravenous line was set up. Procedures differ when dealing with the pediatric population compared to the adult population. With adult burn patients, early excision and skin grafting are standard procedures; with children, however, there is a waiting period until demarcation before skin transplantation except for frank deep dermal burn we did early excision with autograft to decrease incidence of systemic infection and decrease hospital stay.

Statistical analysis:

Quantitative (numerical) variables will be described as mean \pm SD, ordinal as median (interquartile range) and qualitative (categorical) data as numbers and percentage. Student's *t*-test, Mann-Whitney U-test and Chi-square test or Fisher's exact test will be used for comparisons as appropriate

Statistical package:

Statistical analysis performed using computer software statistical package for the social science (SPSS). A paired sample test was performed.

Results

a- Demographics:

The number of consumed children introduced during the study was about 981 patients of total 9860 patients presented to the unit through the period of study (10.13%). About 393 children need operative management, while the rest followed-up at outpatient clinic without admission. 588 children were boys while the rest were girls.

Table (1): Demographics of patients.

Style of management	Cases	Percentage
Admitted	393	40
OPC	588	60
Total	981	

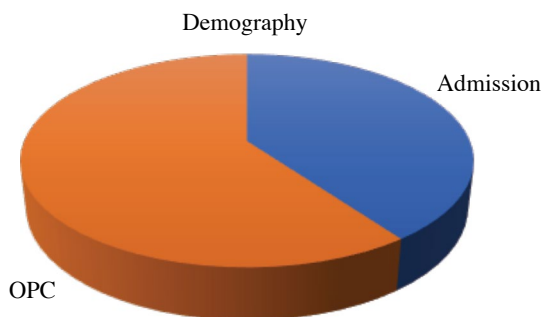


Fig. (1): Demographics of patients.

b- Referral:

During our study around 45% of patients were referred by themselves. (441 cases) were acute cases (presented within the first 24 hours), while 55% referred from other hospitals which considered delayed cases (540 cases).

c- Treatment:

393 patients (40 % of total patients presented to unit) need hospital admission divided into 193 patients (49%) whose depth were varied from superficial to deep dermal admitted and passed conservative with dressing and discharged when they were free for OPC follow-up while the rest 200 patients (50%) need operative management (excision and skin grafting). Table (1).

d- Type of burn:

Scald burns were the most common type of burn, making up 52.8% of the cause of burns (518

cases), with flame burn accounting for 35.6% of cases (349 cases). Electrical and chemical burns accounted for 5% (49 cases) and 6.6% (65 cases) of cases, respectively. Hot water was the most common cause of scald burns and soup was the second most common cause.

Table (2): Types of burn.

Type	Percentage
Scald	52.8
Flame	35.6
Electrical	5
Chemical	6.6

e- Place of burn:

Home was the most common place of burn with 688 cases (70.13%). The bathroom was the most often utilized space, especially for patients who were in impoverished communities with inadequate water delivery systems and kerosene heaters for boiling water. This indicates that youngsters are more likely to trip over boiling water and get severe burns.

Table (3): Place of burn.

Place	Cases	Specific place	Case
Home	688	Bathroom	323
		Kitchen	253
		Other	112
Outside	293	Street	193
		Others	100
Total	981		981

f- Seasonal relationship:

Winter (41.27%) and spring (28.57%) show a significantly higher prevalence of children burns than summer (16.36%) and autumn (13.8%). This results from heating water to a boil for bathing or from building a fire to stay warm.

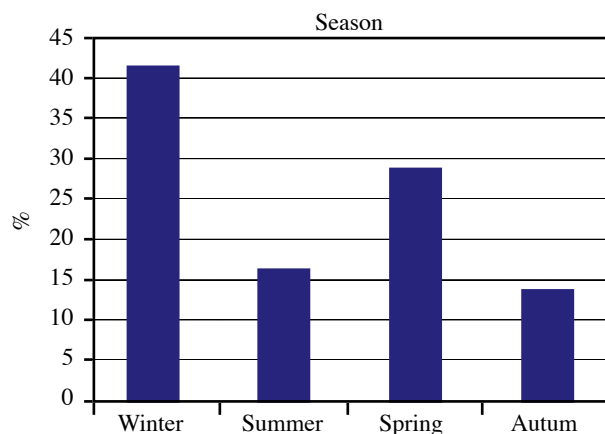


Fig. (2): Seasonal variation.

g- Hospital stays:

The hospital stay average was about 25±15.6 days (mean ± SD) and ranged from 1 to 8- days.

h- Socioeconomic factors:

All patients were from low-paying families. 676 (68.9%) of the consumed kids had an uneducated mother, while 305 patients (31.3%) had an educated mother. 600 of the burned children (61.16%) lived in the city, while the rest were from the village and traveled to Cairo for treatment.

Table (4): Socioeconomic variations.

Education	Cases	Residence	Case
Un -Educated mother	676	City	600
Educated	305	Village	381
Total	981	Total	981

i- Morbidity and mortality:

The number of dead children in our study was about 33 children (3.3%). 20 cases had a burn percentage of more than 50% TBSA and 8 had a percentage between 40% and 50% TBSA.

j- Gender:

588 children were boys (59.9%) while the rest were girls (40.1%).

Table (5): Ggender.

Gender	Cases	Percentage
Boys	588	59.9
Girls	393	40.1
Total	981	

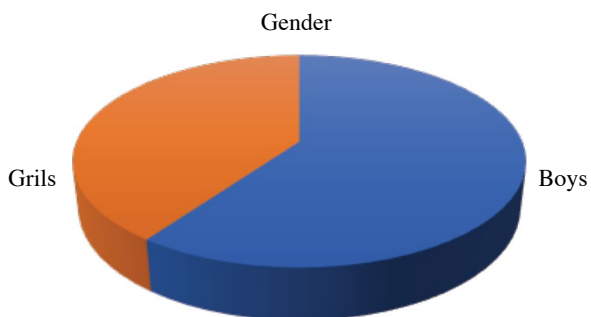


Fig. (3): Pie chart describes gender distribution.

k- Age relationship:

It has been tracked down that in the gathering under 2 years of age, most of the consumed kids had TBSA between 10-20%. In the meantime, in

the gathering consumed between 2-4 years the greater part had over 20% TBSA and this frequency was similar in the patients between 12-15 years old.

Discussion

This study can be compared to other studies carried out in developed and developing countries. Studies conducted in India, Kuwait, Romania, and Ireland have consistently shown a higher proportion of male patients than female patients subjected to burn accidents [9,10,13,16]. In our study, there is a higher proportion of males 588 cases (59.9%) compared to 393 cases females (40.1%). Table (5).

Both emerging and developed nations experienced the same socioeconomic and seasonal fluctuations. These studies highlight the risks associated with raising kids in cramped homes with subpar facilities. Because boiling water is necessary throughout the winter, there is a noticeable rise in burn incidents. There are no safety precautions on the traditional kerosene burner, which is unofficially used in Cairo’s impoverished neighborhoods for cooking and heating water. Kerosene stoves are typically set on the ground, and children can trip over them and get severe burns [2-11].

The most common place of burn incident was home as described [8,9,10] which is compatible with our study as home was the most common place by 688 cases (70.13%). Table (3).

The mode of referral was referral from other centers or hospitals (55%) of cases which is like other studies that indicate referral from other centers was the major mode of referral [5,6,7].

Previous studies conducted in the United States by Rossignol et al., [8], India [10], Nigeria [11], the Czech Republic [15] and Ireland [16] highlighted the increase in burns in children under 3 years of age. Our reviews show different results. Children between the ages of 0 and 2 have the lowest numbers. This is because this is the ideal age of the baby where the baby is cared for and spends most of its time bonding with his/her mother.

Regarding level of education, most of our kids had non educated mothers 676 cases (68.9%) which is like other studies [2,3,4] which reflect the importance of education in increasing the awareness of mothers to protect their children from burn incidents.

The most overcrowded season with burn accidents is Winter (41.27%) then spring (28.57%) due to the need of boiling water which increases the susceptibility of children to these accidents. This is also compatible with other reviews that report the seasonal variation among burn accidents [4,5,6].

There were previous Egyptian studies on the epidemiology of pediatric burn that were done which had similar results to our study [18,19,20]. El Badawy et al., mentioned that most of patients were boys and most of them referred from other primary centers, which is compatible with our study. But our study resembles increasing number of pediatric patients presented to the same burn unit, 981 patients in our study compared to 305 patients in El Badawy et al. One of the main causes of this difference is that our study done along 28 months period compared to 20 months done in El Badawy et al.

Other studies like Nasser et al., [18] and Hemeda et al., [20] reported results which are compatible with our study regarding gender and referral of patients. The major difference between our study and other studies done at the same institution is the number of patients presented to burn unit. That difference may be caused by the increasing number of populations among years along with difficult socioeconomic conditions and low levels of education among large percentage of relatives. That indicates increasing awareness about pediatric patients is mandatory and can be achieved through social media and awareness campaigns.

Conclusion:

The epidemiology of burns in children in our region should be the basis of an intensive media campaign to regulate and increase the safety of products utilized at homes. The biggest difference in this study is that the rate of burn injuries in children increased. This is not only due to public awareness or seasonal fluctuations, but also to the risks faced by the pediatric population due to low socio-economic status, where both parents are forced to work and are forced to leave their children unattended for extended periods of time.

References

- 1- The Annual Statistical Report of the Arab Republic of Egypt. The Egyptian Authority for General Mobilization and Statistics, p. 36., 1996.
- 2- Yiacomattis A. and Roberts M.: An analysis of burns in children. *Burns*, 3: 195, 1977.
- 3- Smith R.W. and O'Neill T.J.: An analysis into childhood burns. *Burns*, 10: 117-24, 1984.
- 4- Green A.R., Fairclough J. and Sykes P.J.: Epidemiology of childhood burns in childhood. *Burns*, 10: 368, 1984.
- 5- Phillips W., Mahairas E., Hunt D. and Pegg S.P.: The epidemiology of childhood scalds in Brisbane. *Burns*, 12: 343-50, 1986.
- 6- Bradshaw C., Hawkins J., Leach M., Robins J., Vallance K. and Verboom K.: A study of childhood scalds. *Burns*, 14: 21-4, 1988.
- 7- Mcloughlin E. and McGuiem A.: The causes, cost and prevention of childhood burn injuries. *Am. J. Dis. Child*, 144: 677, 1990.
- 8- Rossignol M., Locke J.A. and Burke J.F.: Pediatric burn injuries, New England, USA. *Burns*, 16: 41-8, 1990.
- 9- Lari A.R.A., Bang R.L., Ebrahim M.J.K.H. and Dashti H.: An analysis of childhood burns in Kuwait. *Burns*, 18: 224, 1992.
- 10- Gupta M., Gupta O.K. and Goil P.: Pediatric burns in Jaipur, India: An epidemiological study. *Burns*, 18: 6-67, 1992.
- 11- Iregbulem L.M. and Nnabuko B.E.: Epidemiology of childhood thermal injuries in Enugu, Nigeria. *Burns*, 0: 22-226, 1993.
- 12- Wailer A.E. and Marshall S.W.: Childhood thermal injury in New Zealand resulting in death and hospitalization. *Burns*, 19: 371-6, 1995.
- 13- Eneseu D., Davidescu I. and Enescu M.: Pediatric burns in Bucharest, Romania, 4327 cases over a 5-year period. *Burns*, 20: 154-6, 1994.
- 14- Chapman J.C., Sarhadi N.S. and Watson A.C.: Declining incidence of pediatric burns treated as inpatients and outpatients in a regional center. *Burns*, 20: 106-10, 1994.
- 15- Dedovic Z., Boychta P., Koupilova I. and Suchanek I.: Epidemiology of childhood burns at the Burn Center in Brno, Czech Republic. *Burns*, 22: 125-9, 1996.
- 16- Cronin K.J., Butles P.E.M., McHugh M. and Edwards G.: A 1 year prospective study of burns in an Irish pediatric burns unit. *Burns*, 22: 221-4, 1996.
- 17- World Health Organization. International Statistical Classification of Diseases and Related Health Problems. (Updated 2006. Accessed April 2010). Available from URL: <http://www.who.int/classifications/apps/icd/icd10online>.
- 18- Nasser S., Mabrouk A. and Wafa A.M.: Twelve years epidemiological study of paediatric burns in Ain Shams University, Burn Unit, Cairo, Egypt. *Burns: Journal of the International Society for Burn Injuries*, 35 (8): e8-e11, 2009.
- 19- Hemeda M., Maher A. and Mabrouk A.: Epidemiology of burns admitted to Ain Shams University Burns Unit, Cairo, Egypt. *Burns: Journal of the International Society for Burn Injuries*, 29 (4): 353-358, 2003.
- 20- El-Badawy A. and Mabrouk A.R.: Epidemiology of childhood burns in the burn unit of Ain Shams University in Cairo, Egypt. *Burns: Journal of the International Society for Burn Injuries*, 24 (8): 728-732, 1998.