Original Paper

Population Profile of Children in Romania Affected by Burns

DENISA MARIA CANUT[1], MARIUS EUGEN CIUREA[1]

[1]Faculty of Medicine, University of Medicine and Pharmacy of Craiova, Romania

ABSTRACT: Burns in children represent a significant challenge in the global health domain. The research aims to analyze the profile of children in Romania affected by burns, focusing on demographic characteristics, severity of burns, applied treatment, and impact on parents. Through this analysis, we aim to better understand the factors involved in these cases and provide relevant information for improving the management and care of children with burns. This study aims to explore various aspects related to the healing of burn injuries in pediatric patients in Romania, analyzing data collected through a questionnaire administered to 107 parents. The profile of children in Romania affected by burns is primarily composed of relatively young children, with an average age of 8.7 years and an even distribution between genders. Most come from rural areas, and the degree of burns ranges from first to fourth degree, reflecting a wide range of severity of injuries. Treatment is diverse, with a tendency towards conservative approaches and a significant proportion of cases without complications. Parental satisfaction is not significantly influenced by the type of treatment, indicating a similar perception regardless of the mode of medical intervention. Improving the management and care of children with burns is achieved through adopting a multidisciplinary and integrative perspective. This involves the use of non-pharmacological therapies such as hypnosis and regional anesthesia for pain and anxiety control. Additionally, the inclusion of adjunctive therapies, such as the use of mesenchymal stromal cells and tilapia skin xenograft, contributes to improving the healing process.

KEYWORDS: *Burns, pediatric burns, management of pediatric burns, burn treatment, burn healing*

Introduction

Burn injuries in children pose a significant challenge in the global health domain.

A study conducted at Sina Hospital (2014) highlighted that the most common demographic characteristic among pediatric burn patients was being the first child in their families (61.8%) [1].

Parents of first-born children may have less experience regarding child safety and accident prevention.

This led to less rigorous supervision or a lack of awareness of potential hazards, such as risks associated with hot liquids, fire, or other heat sources.

Furthermore, a retrospective epidemiological study revealed that the most affected part of the body was the trunk, with scald injuries being the most widespread cause of injuries in pediatric patients [2].

The trunk is a large area of the body and, in many situations, the most exposed.

For example, when children are held in arms or are near the table during meals, spilled hot liquids can flow down onto the trunk, covering a large area of skin.

Types of burns and their causes are diverse. For instance, scalding with hot liquids is a leading cause of burns among pediatric patients, regardless of age groups [3].

Specifically, burns from hot milk led to increased morbidity and mortality compared to burns from hot water, with a higher mortality rate of over 5.6% observed in pediatric patients with hot milk burns [4].

Burns from hot milk can lead to increased morbidity and mortality compared to burns from hot water for several reasons: Hot milk has higher viscosity than hot water, meaning it can stay on the skin for a longer period before being removed.

This allows for prolonged heat transfer, causing deeper burns.

Milk contains fats and proteins that can alter tissue response to burns.

These substances can intensify the body's inflammatory response to the injury, leading to greater tissue damage.

Burns from hot milk may have a higher risk of infection.

Milk can be a conducive environment for bacterial growth, and their presence on an open wound can facilitate infection.

Infections can significantly complicate burn healing, increasing morbidity and the risk of mortality.

The COVID-19 pandemic has had a significant impact on public health globally, including in the field of pediatric injuries.

A surprising yet essential aspect was the influence of this health crisis on the incidence of burns in children. Georgeades et al. (2023) observed a concerning increase in burn cases among children during the pandemic, even as families were encouraged to stay at home.

10.12865/CHSJ.50.02.17

Increased parental stress due to the pandemic, including remote work, financial concerns, mental health issues, and general uncertainty, contributed to decreased attention to household and child safety, increasing the risk of accidents [5].

Restaurant closures and limitations on dining out led families to cook more at home.

This included involving children in cooking activities, increasing the risk of exposure to burns through contact with hot surfaces, liquids, or oils.

In the quest for solutions to prevent burns in children, social networks have been identified as a promising channel for disseminating public health messages.

Batra et al. (2021) explored this possibility through a pilot study, which demonstrated the effectiveness of targeted advertisements on social media platforms in reaching a vast audience.

This discovery opens up new horizons for awareness and education campaigns regarding burn prevention [6].

Examining specific characteristics of burns in children, research conducted by Trotter et al. (2020) focused on incidents of burns caused by outdoor fires, with a mean age of 6.4 years among the victims.

These findings emphasized the importance of tailoring prevention efforts to the age-specific characteristics of children to increase intervention effectiveness [7].

Distinguishing between accidental burns and abusive burns is another critical aspect in managing these injuries in children.

The study conducted by Rosado et al. (2019) identified determinants such as the type of caregiver, the location of the incident, and the time interval until seeking medical help as means of distinguishing between the two types of burns.

This distinction is vital to ensure appropriate intervention and protection for the child [8].

The long-term impacts of burns on children are not limited to physical aspects.

Nelson et al. (2018) highlighted profound psychosocial consequences, including an increased risk of anxiety, depression, and post-traumatic stress disorder (PTSD) among survivors.

These findings underscored the need for holistic therapeutic approaches that address both the physical and emotional needs of affected children [9].

Regarding the psychological impact on families, research by Parrish et al. (2019) showed that parental distress is influenced by variables such as the child's ethnicity, time since the injury, and burn severity.

This underscores the importance of psychological support not only for injured children but also for their families, within the recovery process [10].

Socioeconomic and cultural factors also played a significant role in the incidence and management of pediatric burns, as demonstrated by the study conducted by Karan et al. (2015) [11].

Understanding local contexts is essential in developing effective prevention strategies.

Advancements in biochemical research, represented by the work of Zang et al. (2016), have opened new perspectives for diagnosing and treating burns in children [12].

Their study on the biochemistry of burn blister fluid indicated that proteomics and metabolomics can provide valuable insights for optimizing the management of these complex injuries.

Finally, Fairbrother et al. (2020) indicated the need for a comprehensive approach in emergency management to reduce morbidity and mortality in pediatric burn patients [13].

This includes resuscitation, fluid management, pain control, infection prevention, along with clear discharge care and follow-up instructions.

Material and Methods

This study aims to explore various aspects related to the healing of burn injuries in pediatric patients in Romania by analyzing data collected through a questionnaire administered to 107 Romanian parents.

The research purpose is to analyze the profile of the population of children in Romania affected by burns, with a focus on demographic characteristics, severity of burns, applied treatment, and impact on parents.

Through this analysis, we aim to better understand the factors involved in these cases and provide relevant information for improving the management and care of children with burns.

Descriptive statistical analysis was utilized to highlight the characteristics of the population of children with burns, such as age, affected body surface area, treatment duration, time to healing, satisfaction with care, and psychological impact.

Additionally, categorical variables such as the child's gender, region of residence, degree of burn, type of treatment, and presence of complications were examined.

Finally, an independent t-test was conducted to analyze whether there is a statistically

significant difference between the satisfaction levels of parents whose children received conservative treatment versus those who received surgical treatment.

Data analysis was performed using the SPSS software version 26.

Results

Table 1 shows that the average age of the children is 8.7 years, suggesting that the studied population is relatively young.

The mode being 15 years indicates a higher frequency of burn cases among adolescents, although the high standard deviation (4.81 years) indicates significant variation in the age of the affected children.

Table 1. Descriptive Statistics.

Characteristic	Mean	SD	Median	Mode
Child's Age (years)	8.7	4.81	8.0	15
Affected Body Surface Area (%)	25.4	13.73	26.59	N/A
Treatment Duration (days)	55.57	34.35	54	45
Time to Healing (days)	88.79	51.12	85	30
Satisfaction with Care	2.93	1.4	3.0	1
Psychological Impact	3.16	1.42	3.0	5

The affected body surface area had an average of 25.4%, with a close median, indicating a relatively symmetric distribution of data.

However, the high standard deviation (13.73%) reflected considerable variation in the severity of burns.

The treatment duration and time to healing have means of 55.57 days and 88.79 days, respectively, with close medians and modes, suggesting that most children require approximately two months of treatment and almost three months for complete healing.

The large variability indicated by the standard deviations underscores differences in the complexity of cases.

Satisfaction with care and psychological impact had relatively low means (2.93 and 3.16 on a scale of 1 to 5, respectively), with modes at extremes (1 for satisfaction and 5 for psychological impact), suggesting mixed opinions and possibly a significant impact on the well-being of the children.

Table 2. Categorical Variables.

Characteristic	Percentage
Child's Gender	
Male	52.34%
Female	47.66%
Region of Residence	
Urban	43.93%
Rural	56.07%
Degree of Burns	
I	28.04%
II	23.36%
III	19.63%
IV	28.97%
Type of Treatment	
Conservative	41.12%
Surgical	27.10%
Other Types	31.78%
Complications	
Yes	48.60%
No	51.40%

In Table 2, the distribution by gender was relatively balanced, with a slight male predominance (52.34%).

This may indicate that boys are slightly more susceptible to the studied conditions, but the difference is not significant, the result of the z-test for proportions being p=0.406, taking into consideration that, in the year 2022, the proportion of males in our county was 48.32%.

The area of residence showed that a larger proportion of children came from rural areas (56.07%), which may reflect different access to resources, playgrounds, or living conditions contributing to the risk of accidents.

This percentage was significantly larger than the percentage of population in rural areas in our county, 45.26% in 2022, the result of the z-test for proportions being p=0,024<0.05.

The degree of burns highlighted a relatively uniform distribution between degrees I, II, and IV, with a slight prevalence of extreme grades (I and IV), indicating cases of both minor and severe burns (Figure 1).

The type of treatment, ranging from conservative, surgical, and other types, suggested diverse approaches in managing cases depending on the severity and specificity of the injuries.

The presence of complications was almost balanced, with a slight majority of cases without complications (51.40%), which is a positive indicator of the effectiveness of the applied treatments.

10.12865/CHSJ.50.02.17

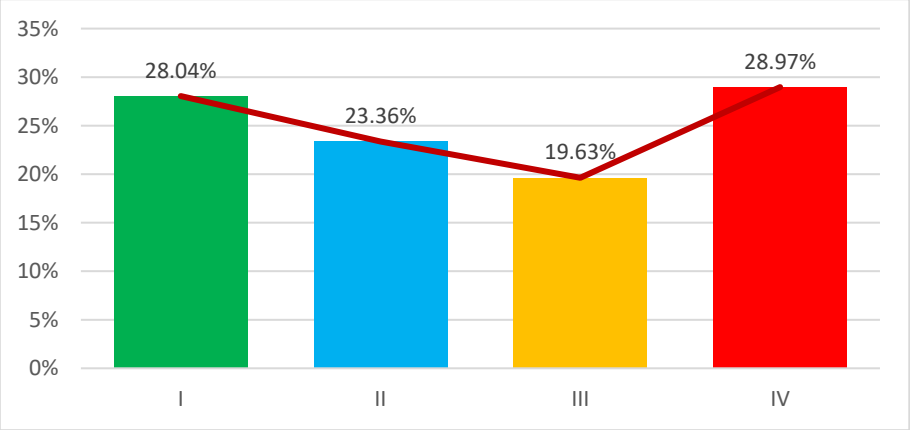

Figure 1. The distribution of the degree of burns in the study group.

The results of Student's t-test for independent data (t=0.0118) indicated that there is no statistically significant difference between the satisfaction levels of parents whose children received conservative treatment compared to those who received surgical treatment.

This was because the p-value (0.9906) was much higher than the conventional significance threshold (p>0.05), suggesting that the differences observed in satisfaction data are very likely due to chance (Table 3).

This finding suggests that the type of treatment (conservative versus surgical) does not significantly influence the level of parental satisfaction, at least regarding the data analyzed in this study.

Table 3. Distribution of patients according to complications and type of treatment.

	Complications		
Type of Treatment	Yes	No	TOTAL
Conservative	19	25	44
Surgical	17	12	29
Other Types	16	18	34
TOTAL	52	55	107

Because there is a clear correlation between patient satisfaction and complications, we wanted to analyze the relationship between the type of treatment and complications.

To our surprise, the result of the Chi square test was p=0.424>0.05, which states that there is no influence of the type of treatment on the development of post-treatment complications.

Similarly, analyzing the relationship between complications and degree of burns, we obtained a Chi square p value of 0.080>0.05, slightly greater than the maximum limit for statistical significance, which means there is only a minor influence of the degree of burns on the development of complications (Table 4).

Table 4. Distribution of patients according to complications and degree of burns.

	Complications		
Degree of Burns	Yes	No	TOTAL
I	9	21	30
II	12	13	25
III	13	8	21
IV	18	13	31
TOTAL	52	55	107

These findings let us to analyzing the relationship between the type of treatment received and the degree of burns (Table 5).

Here we found a significant difference at a 99% confidence level, corresponding to a Chi square p value of p=0.0029<0.01.

This means that the degree of burns leads to completely different therapeutical approaches and to a different level of post-treatment following of particular cases, which decrease the complications and increase the overall patient satisfaction.

Table 5. Distribution of patients according to degree of burns and type of treatment.

	Type of Treatment			
Degree of Burns	Conservative	Surgical	Other Types	TOTAL
I	21	3	6	30
II	10	6	9	25
III	8	6	7	21
IV	5	14	12	31
TOTAL	44	29	34	107

Discussion

Burns in children represent a major public health issue globally, as highlighted by various studies emphasizing the complexity and severity of this problem.

Research has shown how diverse the causes, types, and consequences of burns are among the pediatric population.

From specific demographic factors, such as the prevalence of burns among the first child in families, to anatomical and behavioral particularities predisposing certain body parts, such as the trunk, to higher risks, research underscores the need for a comprehensive approach in burn prevention and treatment.

The impact of the COVID-19 pandemic has exacerbated these risks, highlighting how changes in daily routines and increased stress can affect children's safety in their own homes.

The alarming increase in burn cases during this period has emphasized the importance of careful supervision and the adoption of precautionary measures in the context of more intense domestic life.

On the other hand, studies have paved the way for innovative and effective communication and education solutions, such as using targeted advertisements on social platforms to spread prevention messages.

This approach reflects the potential of digital technologies to reach a vast and diversified audience, offering significant opportunities for awareness campaigns.

Moreover, research has highlighted not only the physical aspects of burn injuries but also the profound psychosocial impact on children and their families, emphasizing the need for holistic approaches addressing emotional recovery and psychological support.

Socioeconomic and cultural factors are also essential in understanding and effectively addressing this issue, indicating the importance of adapting prevention and intervention strategies to specific local contexts.

Improving the management and care of children with burns is achieved through adopting a multidisciplinary and integrative perspective.

This involves using non-pharmacological therapies, such as hypnosis and regional anesthesia, for pain and anxiety control.

Additionally, including adjuvant therapies, such as the use of mesenchymal stromal cells and tilapia skin xenografts, contributes to improving the healing process.

The importance of integrated emergency management, along with nutritional optimization and proper wound dressing use, is essential for optimizing clinical outcomes and reducing complications in this vulnerable population.

Therefore, combating burns in children requires a multi-disciplinary and multi-sectoral strategy, involving education, technological innovation, psychological support, and cultural adaptation, to reduce the incidence of these tragic accidents and ensure complete and sustainable recovery for the affected victims.

Advances in medical and biochemical research also promise new directions for the treatment and management of burns, underscoring the importance of continued investment in research and development in this vital area of pediatric health.

In the field of pediatric burn management, research has highlighted the diversity and complexity of therapeutic approaches, emphasizing the need for a multidisciplinary perspective and ongoing innovation to improve clinical outcomes.

The studies analyzed in this paper bring to the forefront a range of interventions and care strategies aimed at both pain control and infection prevention, as well as improving the healing process and quality of life for patients.

Chester et al. (2016) investigated the therapeutic potential of medical hypnosis in managing pain and anxiety in pediatric burn patients, suggesting that non-pharmacological approaches could effectively complement standard treatment [14].

This idea is reinforced by Richman et al. (2021), who emphasize the efficacy of regional anesthesia in controlling postoperative pain, offering a viable alternative to opioids and highlighting the importance of effective pain management in the recovery of burn patients [15].

Regarding healing strategies, Pelizzo et al. (2018) explored the therapeutic potential of mesenchymal stromal cells, providing insight into adjuvant therapies that could significantly improve the healing process [16].

Similarly, the study conducted by Lima et al. (2019) demonstrated the usefulness of tilapia skin xenografts in the treatment of superficial burns in children, paving the way for new therapeutic options in managing these injuries [17].

In the context of a comprehensive approach to pediatric burn care, Fairbrother et al. (2020) emphasized the importance of integrated emergency management, including aspects such as resuscitation, pain control, and infection prevention, to optimize clinical outcomes and reduce complications [13].

Furthermore, aspects such as wound dressings and nutritional optimization played a significant role in the healing process.

The study by Vitale et al. (2020) demonstrated the importance of choosing appropriate dressings based on the individual needs of patients.

Thus, the practical nature of Xeroform and bacitracin dressings in pediatric burn injuries was discussed, showing healing within 7-21 days for most patients aged 0-5 years [18].

While Hall et al.'s (2020) work showed the impact of malnutrition on burn progression and the importance of nutritional optimization to support recovery, indicating that malnourished

 10.12865/CHSJ.50.02.17

patients have a higher susceptibility to infections, poor wound healing, and longer hospitalizations.

Nutritional optimization is vital for improving surgical outcomes in this vulnerable population [19].

Conclusions

In this study, we have shown that the profile of children affected by burns in Romania mainly consists of relatively young children, with an average age of 8.7 years and an even distribution between sexes.

Most of them came from rural areas, and the degree of burns varies between grades I and IV, reflecting a wide range of injury severity.

The treatment is diversified, with a tendency towards conservative approaches and a significant proportion of cases without complications.

Parental satisfaction is not significantly influenced by the type of treatment, indicating a similar perception regardless of the medical intervention method.

Conflict of interests

The authors declared that they had no conflict of interest regarding the content of the article.

References

1. Rahmani F. Ebrahimi Bakhtavar H. Zamani A. Abdollahi F. Rahmani F. Demographic features of pediatric patients with burn injuries referred to the emergency department of Sina hospital in Tabriz. J Anal Res Clin Med, 2017, 5(1):4-8.
2. Kazemzadeh J, Vaghardoost R, Dahmardehei M, Rabiepoor S, Farzan R, Kheiri AA, Khosravy R. Retrospective epidemiological study of burn injuries in 1717 pediatric patients: 10 years analysis of hospital data in Iran. Iran J Public Health, 2018, 47(4):584.
3. Özlü Ö, Basaran A. Epidemiology and outcome of 1442 pediatric burn patients: A single-center experience. Turk J Trauma Emerg Surg, 2022, 28(1):57.
4. Yontar Y, Esmaoglu A, Coruh A. Retrospective analysis of burn injuries caused by hot milk in 159 pediatric patients: 14 years of experience in a burn unit. Ulus Travma Acil Cerrahi Derg, 2014, 20(4):281-285.
5. Georgeades CM, Collings AT, Farazi M, Fallat ME, Minneci PC, Sato TT, Speck KE, Van Arendonk K, Deans KJ, Falcone RA Jr, et al. A Multi-institutional Study Evaluating Pediatric Burn Injuries During the COVID-19 Pandemic. J Burn Care Res, 2023, 44(2):399-407.
6. Batra N, Colson CD, Alberto EC, Burd RS. Using Social Media for the Prevention of Pediatric Burn Injuries: Pilot Design and Usability Study. JMIR Form Res, 2021, 5(7):e23242.
7. Trotter Z, Foster K, Khetarpal S, Sinha M. Age-Based Characteristics of Pediatric Burn Injuries from Outdoor Recreational Fires. J Burn Care Res, 2020, 41(6):1198-1201.
8. Rosado N, Charleston E, Gregg M, Lorenz D. Characteristics of accidental versus abusive pediatric burn injuries in an urban burn center over a 14-year period. J Burn Care Res, 2019, 40(4):437-443.
9. Nelson S, Conroy C, Logan D. The Biopsychosocial Model of Pain in the Context of Pediatric Burn Injuries. Eur J Pain, 2018, 23(3):421-434.
10. Parrish C, Shields A, Morris A, George A, Reynolds E, Borden L, Hankinson J, Ziegfeld S, Stewart D, Ostrander R. Parent Distress Following Pediatric Burn Injuries. J Burn Care Res, 2019, 40(1):79-84.
11. Karan A, Amado V, Vitorino P, et al. Evaluating the socioeconomic and cultural factors associated with pediatric burn injuries in Maputo, Mozambique. Pediatr Surg Int, 2015, 31:1035-1040.
12. Zang T, Broszczak DA, Broadbent JA, Cuttle L, Lu H, Parker TJ. The biochemistry of blister fluid from pediatric burn injuries: proteomics and metabolomics aspects. Expert Rev Proteomics, 2016, 13(1):35-53.
13. Fairbrother H, Long M, Haines E. Optimizing emergency management to reduce morbidity and mortality in pediatric burn patients. Pediatr Emerg Med Pract, 2020, 17(Suppl 6-2):1-51.
14. Chester SJ, Stockton K, De Young A, Kipping B, Tyack Z, Griffin B, Chester RL, Kimble RM. Effectiveness of medical hypnosis for pain reduction and faster wound healing in pediatric acute burn injury: study protocol for a randomized controlled trial. Trials, 2016, 17(1):223.
15. Richman M, Berman JM, Ross EM. Regional anesthesia use in pediatric burn surgery: a descriptive retrospective series. Cureus, 2021, 13(10):e19063.
16. Pelizzo G, Avanzini MA, Mantelli M, Croce S, Maltese A, Vestri E, De Silvestri A, Percivalle E, Calcaterra V. Granulation tissue-derived mesenchymal stromal cells: a potential application for burn wound healing in pediatric patients. J Stem Cells Regen Med, 2018, 14(1):53-58.
17. Lima Júnior, E.M., de Moraes Filho, M.O., Forte, A.J., Costa, B.A., Fechine, F.V., Alves, A.P.N.N., de Moraes, M.E.A., Rocha, M.B.S., Silva Júnior, F.R., Soares, M.F.A.N. Pediatric Burn Treatment Using Tilapia Skin as a Xenograft for Superficial Partial-Thickness Wounds: A Pilot Study. J Burn Care Res, 2020, 41(2):241–247.
18. Vitale LC, Livingston J, Curtis E, Oag K, Shanti CM, Klein JD. The use of xeroform dressings for partial thickness scald burn injuries in a verified pediatric burn center. J Burn Care Res, 2020, 41(Supplement_1):S194–S195.
19. Hall J, Abbott L, Prelack K, Friedstat J. Effective treatment of malnourished pediatric burn patients. J Burn Care Res, 2020, 41(Supplement_1):S11.

Corresponding Author: Denisa Maria Canut, University of Medicine and Pharmacy of Craiova, 2 Petru Rareş Street, 200349 Craiova, e-mail: denisacanut@yahoo.com