

Original Article

Clinical Profile and Outcome of Burn Injuries amongst Children in a Tertiary Care Center of North India

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ABSTRACT

Objectives: The study aims to describe the clinical characteristics and outcome of pediatric burn patients admitted to a tertiary care hospital. **Patients and methods:** This was a cross-sectional, retrospective study that reviewed the records of all burn victims aged 0 to 12 who were admitted in a tertiary care hospital in North India over one year. Collected data included patient demographics such as age, gender, burn causal agents, discharge time, Total body surface area (TBSA) burnt by using Lund and Brauder's Rule, the duration of stay, the season and month of admission that burn occurred, and burn characteristics, such as region of body involved, percentage of area burnt, complications and outcome. **Results:** 129 paediatric burn patients under 12 were included, with median age of 4 years. Scald caused the majority of burns (81.4%), followed by dry burns (14.7%) and electric injuries (3.9%). The Median burn percentage was 20, and most burn patients were encountered during the winter season. The face and neck (56.6%) were involved in majority of cases, with a 4.6% overall mortality rate. **Conclusion:** This retrospective study provides valuable insights into the clinical profile of burn patients admitted to a tertiary care center in North India. The study's findings can help guide the development of targeted interventions and resource allocation to improve burn care in this region, ultimately reducing morbidity and mortality among burn patients.

Key words: Pediatric burn, scald, accidental injuries, electrocution

Childhood injuries are a significant public health issue worldwide, affecting millions of children each year¹. According to the WHO, globally 1,600 children and adolescents under the age of 19 die each day from preventable injuries². Burns account for many these injuries and are a leading cause of morbidity among children, especially in the developing world³. Accidental occurrences at home environments are common, making burn injuries the second leading cause of unintentional deaths in children under 5 years of age^{4,5}. The most common cause of this type of injury is scald burns or lesions caused by hot liquid.

Burn injuries can be devastating for children, resulting in not only physical pain and scarring but also emotional trauma and long-term psychological effects. Severe burns can cause lifelong disfigurement, disability, and developmental delays, affecting a child's quality of life and self-esteem. Moreover, burn injuries can have a significant financial impact on families and healthcare systems. Prompt and proper treatment is crucial to prevent long-term consequences and ensure optimal recovery²⁻⁴.

Burn morbidity and mortality are determined by several factors, including age, sex, depths of burn, percentage total body surface area (TBSA) involvement, and affected body regions. Causative agents also vary by age group with scald burns from hot liquid being more common in young infants^{6,7}, and burning by combustion being more common in adolescents^{8,9}.

Despite the large amount of international literature on pediatric burn injuries, there is a lack of data from Indian subcontinent. Thus, we planned this study to describe the clinical profile and outcome of pediatric burn patients admitted in a tertiary care hospital.

METHODS

This was a cross-sectional, retrospective study that reviewed records of all burn victims aged 0 to 12 who were admitted to a tertiary care hospital in northern India. Collected data included patient demographics such as age, gender, burn causal agents, discharge time, TBSA burnt using Lund and Brauder's Rule, the duration of stay, the season and month of

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admission the burn occurred, and burn characteristics like, region of body involved, percentage of area burnt, complications and outcome.

The study included 129 children, admitted from 1st January 2021 to 31st December 2021. These patients were classified based on age, gender, burn size (% TBSA), etiology, complications and outcome. Patients with incomplete records or missing data were excluded from the study.

Ethical approval was obtained from the institutional ethical committee. Data was entered and stored in a purpose-built MS Excel sheet, and SPSS software was used for analysis.

RESULTS

Demographics

The study included 129 paediatric burn patients, under 12 years of age were included with a median age of 4 years (IQR 2-7.6). The children were divided into three age groups: the infants/ toddlers (0-2 years) being 34%, early childhood (3-6 years) being 36%, and late childhood (7-12 years), comprising 30% of total patients. Males (62%) were affected more frequently than females (37.5%). The majority of patients (74.4%) are between the ages of three and six years old and live in urban areas.

Table 1: Baseline characteristics of the study population

Variable	Total (n=129)	0-2 years (n=42)	3-6 years (n=49)	7-12 years (n=38)
Age in years*	4 (2, 7.6)			
Gender				
Males	80 (62%)	26 (61.9%)	28 (57.1%)	26 (68.4%)
Females	49 (38%)	16 (38.1%)	21 (42.9%)	12 (31.6%)
Cause of burn				
Scald	105 (81.4%)	37 (88.1%)	44 (89.8%)	24 (63.2%)
Flame	19 (14.7%)	5 (11.9%)	4 (8.2%)	10 (26.3%)
Electrical burn	5 (3.9%)	0	1 (2%)	4 (10.5%)
Residence				
Urban	96 (74.4%)	32 (76.2%)	39 (79.6%)	25 (65.8%)
Rural	33 (25.5%)	10 (23.8%)	10 (20.4%)	13 (34.2%)
Burn percentage (TBSA)*	20 (15, 30)	20 (15, 25)	20 (15, 30)	22.5 (15.75, 30)
Duration of hospital stay*	7 (4, 11)	7 (3.25, 10.75)	6 (4, 11)	8 (5, 12)
Mortality	6 (4.6%)	2 (4.8%)	2 (4.1%)	2 (5.3%)

*Median (Interquartile range)

Cause of burns

Scald caused the majority of burn (81.4%), followed by dry burn (14.7%) and electric injuries (3.9%). While boiling water (48.3%) was the most common cause of scalds, other hot fluids such as hot milk (13.67%), hot beverages (17.27%), and hot oil (5.45%) were found to be the culprits in other patients. Scald burns were more common in children under 7 years old than in older children (Table 1). Overall, only 14.7% of children suffered burns directly caused by fire, which included flame injuries from stoves, play with fire, and cylinder bursts.

Percentage of burn (TBSA)

The Median burn percentage was 20 (IQR 15, 30). While, amongst the specific age groups, older children (>7 years old) had slightly higher median TBSA (22.5) than younger children (20).

Hospital Stay

The median duration of stay across all age groups was found to be 7 days (IQR 4,11), with older children having a higher median duration of stay of 8 days (IQR 5,11).

Seasonal Trends

Most burn patients were encountered during the winter season, (50.4%), as compared to summer (Figure 1), with January being the busiest month.

Distribution of burns according to bodily regions involved

The face and neck (56.6%) were involved in most cases (Figure 2). The right upper extremity was more commonly involved (48.1%) often than left upper extremity (44.1%). The abdomen and back were involved in 26% and 10.6% of cases

respectively. The genitalia (3.3%) eyes (4%) and ears (4%) were rarely affected.

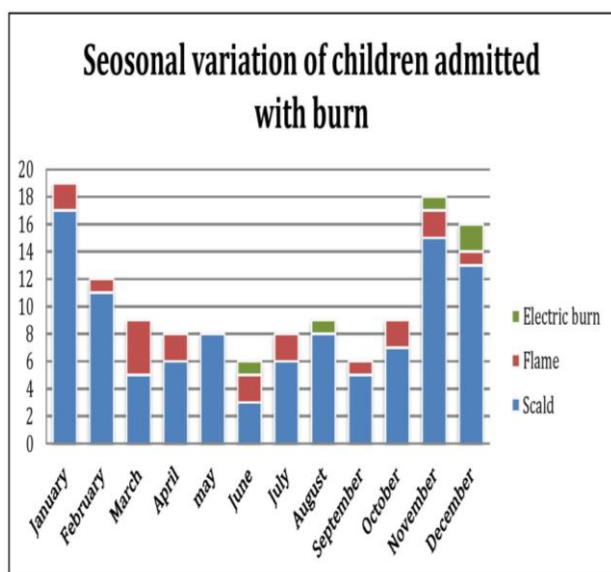


Figure 1: Seasonal variation of children admitted with burn

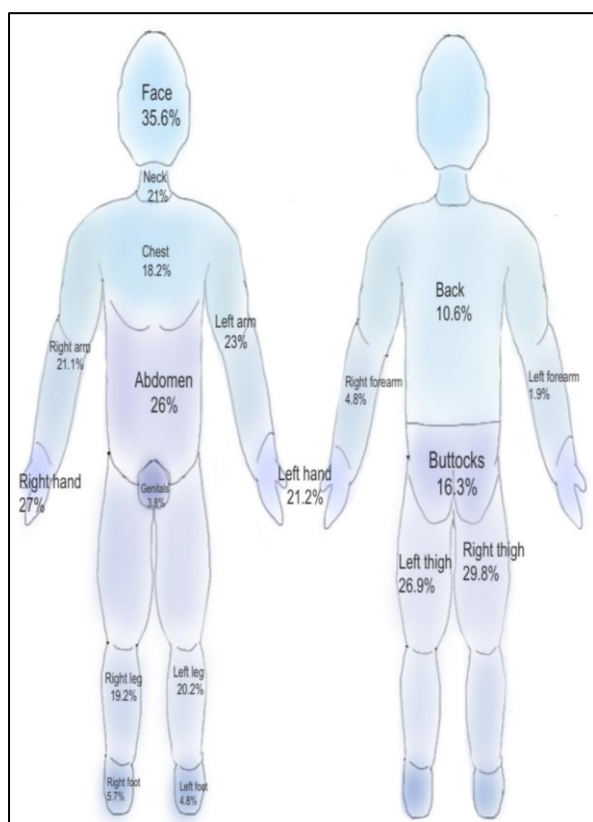


Figure 2: Distribution of burns according to the involved body region

Complications and outcome

Overall, 6 (4.6%) patients expired, mostly due to severe burn and multi-organ dysfunction (Table 2). Two of these deaths resulted from electric shock. The median age of non-survivors was higher (7 Vs. 4) with a higher median burn percentage of

TBSA (45 Vs. 20). Many people developed invasive sepsis despite receiving prophylactic antibiotics, with *Staphylococcus aureus*, *Pseudomonas*, and *Klebsiella* being the most common isolates.

Table 2: Comparison of baseline characteristics between survivors and non-survivors

	Survivors (n=123)	Non-survivors (n=6)
Age*	4 (1.9, 7)	7 (3, 8)
Male	65%	83.30%
Female	35%	16.70%
Burn percentage*	20 (15, 30)	45 (41.25, 52.5)
Duration of hospital stay	7 (4, 11)	6.5 (3.75, 16.75)

*Median (Interquartile range)

DISCUSSION

Burns cause a significant amount of morbidity and mortality in children. The current study describes the epidemiology and clinical profile of 129 children admitted with burns to a tertiary care centre in North India. Most of these cases were related to unintentional but preventable injury mechanisms.

The median age of burn injury patients was 4 years, with the majority (70%) being younger than 7 years of age. Biscegli et al. observed a higher prevalence in children younger than 6 years (52.9%).³ Similarly, a higher prevalence in children under 4 years (57.6%) was described by Viana et al.¹⁰ An Indian study by Ramakrishna et al found the mean age of patients was 2.5 years, with most children under the age of 2 years.⁶ Male preponderance has been described in many of the previous studies as well.⁹⁻¹²

In our study, scalding was the most common type of burn followed by flames and electrical burns. According to a systematic review from China by Kai Yang et al¹³, Scald is responsible for 59-92% of all burns. Other studies in Southeast Asia including India and Pakistan, have documented high percentage of scald burns. However, according to the study by Oludiran et al., flame burns from kerosene (52%) are the most common form of burns.¹⁴ This could be due to Nigeria's widespread use of paraffin for lighting and cooking.

The face and neck were the most involved body region (56.6%) in the index study. Different studies have reported varying degrees of involvement in various body parts. While Iqbal et al. and Chen et al.¹⁵ reported that upper limbs were more involved in their studies, Lu et al.¹⁶ reported that lower limbs were the most affected body part. Li et al.¹⁷ discovered

that the head and neck were the most frequently affected site, which is consistent with our findings.

Seasonal variation was observed in our study, with more than half of the patients admitted during winter months, which is consistent with the findings of Iqbal *et al.* Heating water for domestic purposes, such as bathing and washing clothes, may contribute to an increase in burns during the winter season. Festivals involving use of firecrackers (Diwali, Dusshera and New Year) also contribute to more burns during the winter. However, a study from Netherlands found more burn cases during the summer months with peak in the month of July.¹⁸ In contrast De'Souza *et al.*¹⁹ found no seasonal variation in their study of the United States of America.

In the current study, patients stayed in the hospital for an average of seven days. In a Brazilian study, the average length of stay was 5.87 days²⁰, while other studies have reported higher stays of 11.8 and 16.3 days respectively.²¹⁻²² Our study revealed a mortality rate of 4.6%. Iqbal *et al.* found a 9.9% mortality rate in their study. Other studies from Turkey and India have documented a mortality rate of 10.1-16%.²³⁻²⁴

Our study's limitations includes its retrospective nature and the fact that we only included admitted patients from a single tertiary care center, which may not be an accurate indicator of burn incidence. The strength of our study is that we collected data for an entire year and analysed all of it, including the area and location of the burn, complications, and outcome.

CONCLUSION

In our study, we discovered that scalds were the most common cause of burn (81.4%) with nearly half of cases occurring during the winter months. The face and neck were found to be most involved body regions (56.6%). Patients had a median hospital stay of 7 days and a mortality rate of 4.6%. Non-survivors reported a higher median burn percentage for TBSA than survivors.

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