

Epidemiological study of

Burn injuries at Nepal Cleft and Burn Centre Kathmandu

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ABSTRACT

INTRODUCTION: Burn is one of the major global public health problem associated with significant morbidity and mortality. Southeast Asia is considered as “the epicenter of burn injuries” because more than half of the fire-related deaths occur in Southeast Asia alone. With adequate awareness program it is a preventable condition. We aim to provide an overview of the basic epidemiological characteristics of burn patients admitted at Nepal Cleft and Burn center in Kathmandu.

METHOD: A prospective descriptive study was conducted in the patients presenting with the burn injury at the department of Burns, Plastic and Reconstructive Surgery of Nepal cleft and burn center, Kirtipur, after taking informed consent from June 2022 to October 2022 Burn Injuries of 194 consecutive patients were assessed.

RESULT: There were a total of 194 patients enrolled in the study. The burn injuries were found to be slightly more common in males (59.7%) than in females (40.3%) with high incidence in children and young adult. Flame burn (45.3%) being most common mode of injury followed by scald burn (26.2%) and high incidence of injury was found to be in kitchen while cooking(54%). This might be because firewood and kerosene oil are still common source of energy to cook food. The maximum number of patients 102(61.8%) had less than 20% TBSA burn. The commonly involved area was the upper extremity followed by the lower extremity. The most common surgical procedure was STSG or flap coverage. Though most of the patients (78.5%) were treated successfully and discharged, few patients (8.7%) refused to continue treatment and went home against medical advice and 24 patients (12.3%) expired during the course of treatment.

CONCLUSION: Burn injury is one of the common public health problem in our country. Children and female are at higher risk. Burn injuries are frequently sustained while cooking, but they can also happen at work sites and in other industries. After burn injury, recovery is slow and often burn patients have prolong hospital stay. Public awareness, preventive knowledge and proper burn care helps to decrease the burden of burn injury in the society.

KEYWORDS: Burn epidemiology, Burn injury, Burn management

INTRODUCTION

Burn is one of the major global public health problem associated with significant morbidity and mortality. The World Health Organization claims that 11 million people experience burn injuries annually in the world, and 95% of these injuries occur in low-income and middle-income countries.^{1,2} Southeast Asia is considered as “the epicenter of burn injuries” because

more than half of the fire-related deaths occur in Southeast Asia alone.³ Burn injury along with the morbidity and mortality associated with psychological, economic and social impact on the patient and their family members. With adequate awareness program it is a preventable condition. To conduct a well-designed awareness program, the knowledge about the pattern of burn injuries, their associated risk factors is quite essential.

Burn injuries occur when a portion of our body comes into touch with a hot item, such as fire or hot liquids. The damage depends on the temperature of the object and the duration of contact. Chemicals such as acid and alkali can also cause this kind of injury. Electrical injury, flash injury and lightning injury are also other type of burn injury.

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Depending upon the thickness of the burn wound, burn injury can be of two types: 'Superficial burn injury' and 'deep burn injury'. In the superficial burn injury, only the upper layer of skin i.e. epidermis and some portion of dermis are burned whereas in deep burn injury, deeper layer of skin where epidermis and most of the dermis are injured. Superficial burns heal by themselves usually by two weeks if the wound doesn't get infected. Deep burns do not heal by themselves and the damaged skin and deeper tissues need to be removed surgically and has to be covered with a split thickness skin graft(STSG).

Nepal is lower middle-income country(LMIC). The mountainous terrain, lack of transport and poor communication are significant physical obstacles to seeking treatment. widespread fatalistic attitude influences some burns victims against seeking treatment. As we know prevention is better than cure, so awareness and prevention program must be implemented to reduce the incidence of burn injuries.

This study was done to describe the demography of the burn injuries and early outcome of the treatment of the acute burn patients treated in June 2022 to Oct 2022. The results can be used to institute preventive measures in burn injuries. This study will also help to estimate the burden of burn injury in our society and help to make the policies and treatment protocols to help burn victims.

METHOD

A prospective descriptive study was conducted in the patients presenting with the burn injury at the department of Burns, Plastic and Reconstructive Surgery of Nepal cleft and burn centre, Kritipur from June 2022 to October 2022 All the patients admitted to the burn unit of the department were included in the study. A sample size of 194 was calculated using the Yemane Formula based on the study by Karki et al. Burn patients who refused to give consent for the study and those who were brought dead to the hospital were excluded from the study. Approval for the study was taken from the Institutional review board of the National Academy of Medical Sciences, Bir Hospital. Informed consent was taken from all patients and guardians in cases of minors.

Data regarding patients age, sex, place of burn, mode of burn injury, time of presentation after burn injury, site and percentage burn injury with or without inhalation injury, intervention done, duration of hospital stay and different modalities of management were collected from the time of admission till the final outcome in our hospital and filled in a proforma.

Descriptive statistical analysis was done from the demographic data of patients. Results are expressed

as mean \pm SD, median, interquartile range, absolute number, and percentage. All statistical analyses were performed with computer-based analysis software, SPSS version 26.

RESULT

During the study period, a total 194 cases were admitted with acute burn injuries who came from different part of country. Burn injuries were found to be slightly more common in males (59.7%) than in females (40.3%) as shown in table 1.

Table 1; Distribution of burn injury in male and female

Acute burn	Frequency	Percentage
Male	116	59.7%
Female	78	40.2%

The age of the patients ranged from 9 months to 78 years with a mean age of 25.6 years with SD 19.6. About 40% of the patients were the young adults as seen in Table 2.

Table 2; Distribution of Age Groups of Patients

Age (in years)	Frequency	Percentage
< 17	75	38.6%
18-27	33	17%
28-37	31	15.9%
38-47	23	11.8%
48-57	16	8.2%
58-67	9	4.6%
> 68	7	3.6%

Majority of the burn injuries were due to flame burns (45.3%) followed by scald (26.2%) as shown in Table 3. Burns due other modes like electric, contact and chemical burn were also encountered. Flame and electrical burns were more common in adults whereas scald burn was more common in children.

Table 3; Distribution of Modes of Burn Injury

Mode of injury	Frequency	Percentage
Flame burn	88	45.30%
Scald burn	51	26.20%
Electric burn	35	18%
Contact burn	13	6.70%
Chemical burn	6	3.10%
Other	1	0.50%

The most common place of burn injuries was in the kitchen or home (54.1%) while cooking or warming during winter. Scald burn that occurred mostly in children were also common in kitchen while cooking. Factory and construction site were second common site for burn injury and mostly affecting the adult male as shown in table 4.

Place of injury	Frequency	Percentage
Kitchen/Home	105	54.1%
Industry/Construction site	51	26.3%
Outside	38	19.6%

Most of the patients 107(55.2%) were brought to the burn center on the same day of the injury followed by 51(26.3%) patients who were between 24 to 72 hours of injury as shown in table 5. The longest time elapsed between the burn injury and the hospital arrival was 60 days where as the shortest was 30 min.

Duration	Frequency	Percentage
< 24 hrs	107	55.1%
25-72 hrs	51	26.3%
3-7days	19	9.7%
> 7 days	17	8.7%

Total Body Surface Area Involved in Burn Injury

The range of TBSA burn involved was 1% to 90% with an average of 16.8%. The maximum number patients 102(61.8%) had less than 20% TBSA burn as shown in table 6.

TBSA burn	Frequency	Percentage
< 20%	120	61.8%
21-40%	42	21.6%
41-60%	24	12.4%
> 60%	8	4.1%

The most commonly involved area of the body was the upper extremity (N = 171, 57%) followed by the lower extremity (N = 132, 44%). Other areas involved are shown in Table 7.

Table 7; Distribution of Different Body Parts Involved in Burn Injury

Body parts involved	Frequency	Percentage
Upper extremities	171	28.6%
Lower extremities	132	22.1%
Head and Neck	96	17.1%
Chest	63	10.5%
Abdomen	51	8.5%
Back	45	7.5%
Perineum	39	6.5%

Among all the burn patients, only 29(15%) received cooling on time. Out of 88 patients with flame burn, 5(5.7%) had inhalation injury and one of them need intubation in emergency room.

Management

One hundred thirty-six patients (70.1%) underwent a total of surgical procedures (Table 6). The remaining 58 patients (29.8%) were not operated because 42 of them had superficial burns and did not need surgery, and the remaining 16 patients had either very extensive burn injury that adequate donor skin (auto or allograft) was unavailable or surgery was too risky because of the patient's medical condition or the patient left against medical advice as shown table 8. The common surgical procedure were either STSG or flap coverage.

Table 8; Different Types of Surgeries Performed

Management	Frequency	Percentage
Conservative	58	29.9%
STSG/Flap	107	55.1%
Escharotomy	13	6.7%
Fasciotomy	9	4.6%
Amputation	7	3.6%

During the study period, 152(78.3%) patients were treated successfully and discharge with proper advice, regular follow-up and knowledge regarding first aid management of burn injury. Seventeen (8.7%) patients left the hospital during the course of their treatment. Either they left against medical advice or discharge on request, was the reason for their discontinuation of the treatment. Acceptance of the poor prognosis, cultural belief of dying in a temple, important work at home, and opted for being treated at a different hospital were the most common reasons. A total of 24 (12.4%) patients died at the hospital as shown in table 9. The mortality was higher with increasing TBSA burn (P < 0.05). Most of the patients died because of sepsis (87.5%). Three patients died because of acute respiratory distress syndrome. Other causes of death were hypovolemic shock and aspiration.

Outcome	Frequency	Percentage
Discharge	152	78.3%
LAMA(Leave against medical advice)	17	8.7%
Death	24	12.3%
Transfer to another hospital	1	0.5%

DISCUSSION

This study highlights the data of the burn patients admitted to the Department of Burns, Plastic and Reconstructive Surgery at Nepal cleft and burn center, Kritipur. In a developing country like Nepal, burn injuries, morbidity and mortality related to it represents a serious health problem.⁶

In the present study, burn injury was slightly more common in males than in females which is little difference than other similar studies like Karki et al.⁴ This might be because many cases came from accidental burn injury that occur at industry and construction site and male were predominantly involved. Females were mostly injured during household activities like cooking. The mean age of the people who had suffered burn injury in our study was also quite similar to the other studies. This study revealed that the majority of burn injuries occurred inside the house, which goes along with the systemic review done by Tripathee et al.⁵

Flame burn injury was the commonest mode of injury followed by scald burn injury in this study. Flame burn is common mode of injury in adult and scald burn is common in children, which is quite similar to other studies like Karki et al⁴ and Tripathee et al.⁵

First aid in the form of cooling and resuscitation prior to hospital admission was received by very few numbers of the patients, this is possibly due to lack of knowledge, illiteracy, unavailability of the facility.

Mean total body surface area involved in burn injury in our study was 16.8% which was similar to other studies like Karki et al⁴ and Tripathee et al.⁵ Upper extremities were the most common site involve in burn injuries followed by lower extremities which is also similar to the available studies.

Delayed presentation of the burn patients to this hospital is also a significant problem. Most of the wounds get infected by the time of admission, making the outcome poor.

Surgical treatment was done in 136 patients (70%). The most common surgery was tangential excisions and split-thickness skin grafting. Other surgery like flap coverage, escharotomy, fasciotomy and amputation were also done.

A mortality rate of 18.1% with an average TBSA of 40-50% was found in this study. It is much higher than the mortality rate reported from developed countries like the United States (lethal dose 50: 95% in pediatric populations; mortality rate, 2.7%),⁷ the Netherlands, and Israel⁸⁻⁹ but comparable with the mortality rates reported from Pakistan and India.¹⁰⁻¹¹ This study has slightly improved in mortality rate as compare to the study done in 2018 by Karki at al (19.4%). This might be due to improve in critical care facilities and increased in skilled and trained manpower. The major cause of death was sepsis, which is consistent with other studies.¹² Other causes of mortality were acute respiratory distress syndrome, hypovolemic shock, and aspiration.

The burn center has been trying to improve burn care by working on all these issues, e.g. establishment of a skin bank, improving intensive care unit care with ventilators, monitors, arterial blood gas analyzer and training of team members on burn critical care. Government should also come forward with effective preventive and curative plan to overcome the burden of burn injuries in the country.

CONCLUSION

Burn injury is burning public health problem of our country with high morbidity and mortality. Children and female are at higher risk. Burn injuries are frequently sustained while cooking, but they can also happen at work sites and in other industries. After burn injury, recovery is slow and often burn patients have prolong hospital stay. Awareness programs should be conducted to decrease the occurrence of the burn injury. Acute burn is a challenge to any reconstructive surgeon, which requires a dedicated burn unit with a multidisciplinary team. Factors such as huge financial expense in the treatment, delay in presentation, inadequate first aid and resuscitation, and lack of knowledge about skin donation should be corrected to improve the burn scenario in Nepal.

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