



A STUDY TO EVALUATE THE SPECTRUM OF BURN INJURIES IN HILLY AREA OF NORTH INDIA

General Surgery

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ABSTRACT

The World Health Organization (WHO) broadly defines a burn as an injury caused by heat (hot objects, gases or flames), chemicals, electricity, and lightning, friction or radiation.¹ Annually, burns result in more than 7.1 million injuries, the loss of almost 18 million disability-adjusted life years (DALYs) and more than 250,000 deaths worldwide. More than 90% of the burden of burn injury is borne by low- and middle income countries (LMICs). Burn injuries are a significant cause of morbidity and mortality throughout the world. Burns occur in all age groups and may range in severity from minor requiring no treatment to extremely severe requiring the highest level of intensive treatment. Burn injuries are more common in developing countries like India due to various socio-cultural factors namely illiteracy, poor living and housing conditions, poverty, poor substandard electrical wiring and malpractices like dowry. There is lack of awareness and ignorance regarding burn injuries coupled with the difficulty in accessing health-care services².

Himachal Pradesh (HP) is a mountainous place where many parts are not linked by transportation resulting in many burn victims from these regions never making into the hospital, and even if they make to the hospital, they are presented very late complicating the treatment. In HP, a limited number of burn center and trained physician make it difficult for burn victims to get proper treatment immediately after the injury.

The present study was conducted to measure the pattern (depth and types), mode of burn injuries and clinical profile of burn patients. It may help us gauge the extent of the problem in this part of the country and plan strategies to prevent burns and strategy to minimize its morbidity, disability, and mortality and disability-adjusted life years (DALYs).

AIMS AND OBJECTIVES

1. To study the percentage and degree of burns.
2. To study various modes of burn.
3. To study associated co-morbidities leading to burn.
4. To plan strategies to reduce the morbidity and mortality of burn patients.

MATERIALS AND METHODS

Study site: This study was conducted in the Department of General Surgery in Medical college of hilly region of North India.

Study period and Sample size: This was a three and a half years retrospective and prospective study and included all patients of burn injuries who were admitted in the hospital from 1st January 2014 to 30th June 2016 and patients who either reported to the Casualty OPD or were admitted in the wards from 1st July 2016 to 30th June 2017.

RESULT: We observed that most of the patients in this study who sustained burn injuries are male labourer with low socioeconomic status.

They sustained injuries more during winter season which are mostly accidental & 2nd degree.

CONCLUSION: It should be recognized that burns are a separate complex medical entity requiring multimodal care and rehabilitation. Separate burns centre is the need of the hour in care of these patients as it is a major cause of morbidity and mortality.

KEYWORDS

Chemicals, Electricity, Retrospective

INTRODUCTION

Burn injuries are a significant cause of morbidity and mortality throughout the world. Burn injuries perhaps represent the widest spectrum of any form of trauma. Burns occur in all age groups and may range in severity from minor- requiring no treatment to extremely severe- requiring the highest level of intensive treatment. Burn is a public health problem, accounting for an estimated 265,000 deaths annually throughout the world.

Burn injuries are more common in developing countries like India due to various socio-cultural factors namely illiteracy, poor living and housing conditions, poverty, poor substandard electrical wiring and malpractices like dowry. There is lack of awareness and ignorance regarding burn injuries coupled with the difficulty in accessing health-care services.

Depending on the causative agent burns are classified as physical burns, thermal burns (flame burns and scalds), electrical burns, radiation burns, laser burns and chemical burns. Several factors have been found to be associated with the incidence of burn injury. Some studies suggest gender biases of male over female; however, the relation has not been shown significant.³

In Indian culture, especially in Himachal Pradesh, females are responsible for daily household activities like cooking. This is the reason that more females sustain flame burn compared to males.

Furthermore, many households in India use traditional open fire for cooking purpose which further increases the risk of burn injuries.

The use of open fire for cooking, wearing loose-fitting clothes, and poorly regulated LPG (liquefied petroleum gas) cylinders increase the risk of burn injuries in the India population Himachal Pradesh (HP) is a mountainous place where many parts are not linked by transportation resulting in many burn victims from these regions never making into the hospital, and even if they make to the hospital, they are presented very late complicating the treatment. In HP, a limited number of burn center and trained physician make it difficult for burn victims to get proper treatment immediately after the injury. Patients lose their golden hour for treatment being referred from one hospital to another hospital for burn management. The present study was conducted to measure the pattern (depth and types), mode of burn injuries and clinical profile of burn patients. As no such study has been conducted at hilly institution in the past, it may help us to gauge the extent of the problem in this part of the country and plan strategies to prevent burns and strategy to minimize its morbidity, disability, and mortality and disability-adjusted life years (DALYs).

Depth of Burn

It was assessed clinically:

1. Superficial burns- painful but do not blister.
2. Partial thickness burns- have dermal involvement and extremely painful with weeping and blisters.

3. Deep burns- hard, painless and non-blanching.

Admission Criteria

The following patients of all age groups were admitted

1. Suspected airway or inhalational injury.
2. Burns likely to require fluid resuscitation.
3. Burns likely to require surgery.
4. Patients with burns of any significance to the hands, face, feet or perineum.
5. Patients whose psychiatric or social background makes it inadvisable to send them home.
6. Burn in a patient at extremities of age.
7. Electric burns and acid burns.

All the information obtained as above was recorded and analyzed statistically.

OBSERVATIONS

This prospective study was aimed to determine the spectrum of burn injuries in the patients admitted at Medical College of Northern hilly region. A total of 239 patients were included in the study. The following results were obtained:

General Characteristics

Age and Sex

In the present study, the patient's age ranged from 10 days to 90 years with the mean age of 27.69 years. It was observed that 75 patients (31.38%) were aged less than 18 years. Among these patients, 13 patients were less than a year-old. There were 16 patients (6.69%) who aged more than 60 years. Male outnumbered females with a ratio of 1.95 to 1. Among 239 patients, 158 were male while 81 were females. Among the 239 patients, 125 patients were married while 114 patients were unmarried. Among the 81 females, 39 females were married. Among 39 females, 21 were between 18-30 years age-group.

Among the 239 patients, the majority of the patients (n=87) were injured during winter season while 36 patients were injured during summer season.

The present study observed that 111 patients sustained burn injury due to flame followed by scald (n=68), electricity (n=41), and contact (n=15). 4 patients sustained burn due to chemical means.

The present study also observed that scald was the most common burn injury in pediatric patients (n=45) while the chemical injury was absent in the children. Flame and the electric injury were common among 20-30 year age group (n=39 and n=28 respectively).

Among the 15 patients with contact burns, Bukhari was the most common cause of burn in 12 patients followed by electric heater in 3 patients. Among the 41 patients with electric burn, the high voltage was the major cause of injury in 31 patients followed by low voltage in 10 patients. Out of 31 patients of high voltage patients, 26 patients sustained injury outside.

Degree of Burn Injury

It was observed that 154 patients sustained to second-degree burn followed by first degree + 2nd-degree burn in 53 patients. 32 patients sustained third-degree burn.

The present study also found that there were 55 patients who were referred from primary or community health care centers. These patients were aged more than 18 years and get affected <20% body surface area and sustained injury not due to electrical and chemical means.

It was observed that in 4 patients, it was suicidal for burns while 6 patients sustained burns due to homicide and for the majority of patients (239), it was accidental.

In the present study, 10 patients also sustained associated injuries along with burns. 2 patients each sustained SDH and SAH, 2 sustained a fracture of skull and radius. In the present study, it was observed that 4 patients underwent amputation. Out of these 4 patients, in 3 patient's feet amputated while in 1 patient, 3 fingers were amputated. There were 24 patients who expired during the course of hospitalization due to sepsis and 8 patients were referred to the higher center. There were 206 (86.19%) patients who recovered following treatment.

DISCUSSION

Burn injuries constitute a major health concern with respect to morbidity and mortality, as well as the cost of management particularly in a developing country like India, where few specialized units exist in the public sector. Despite continued efforts to prevent burn injuries, to reduce casualties to the minimum, and to increase safety, together with recent advances in the management of burn injuries, such injuries remain one of the leading causes of injury, morbidity and mortality worldwide, causing more than 5 million deaths each year or 16,000 deaths each day.⁴

In India, over 1 million people are moderately or severely burnt every year. It is estimated that fire-related burns account for 10 million disability-adjusted life years lost globally each year. Most of the burn injuries are seen in low- and middle-income countries. Burns are a leading cause of disability and disfigurement. Burn is a unique, but common mode of suicide as well as homicide worldwide.⁵

Burn injuries rank very high as most severe types of injuries suffered by the human body and attributing high morbidity and mortality among victims. They can be inflicted by heat, scalds, open fire, electricity, friction or contact with chemical substances, radiations, etc. The various modes of sustaining burns are:

1. Flames
2. Scalds
3. Chemical
4. Electrical

A burn is because of flame and fire; more the contact with these more is the extent and depth of the burn. First and foremost priority is to safely extinguish the fire expeditiously. Pouring plain water on fire is the easiest way to douse the flame; however, when the burn is due to electricity, sand is a better option than water. If water is not available, the victim should drop and roll till the fire is extinguished. In case of electrical burns, putting the main switch off as soon as a person has come in contact with an electrical circuit. Furthermore, any attempt to manually separate the victim from the electrical source may result in electric burns to the rescuer too; therefore a wooden scale or rod should be used to push the victim away from electricity. In case of chemical burns, washing the area with copious amounts of ordinary running water for at least half to one hour; reduces the effect of the chemical by simple dilution and at the same time removes it from the body. Once the patient is away from the fire, cooling with running plain water for a short period may help but attempt should be made to quickly transport the patient to the hospital. During the process, one must see that the patient's airway is maintained. Patients who have sustained burn injuries in a closed chamber may develop carbon monoxide poisoning and may require quick cleaning of the throat and put oxygen mask during transportation. Sometimes in case of electrical injuries, the patient may have a respiratory/cardiac arrest for which cardiac massage; mouth to mouth breathing/Ambubag must be used during transportation. Electrical burns respond well to these measures.

Transportation of burn victims should be done as quickly as possible so that the —golden period of resuscitation is not wasted. At the site of injury, all attempts should be made to maintain the airway so that the patient is transported safely. At the same time, all fractures and probable spinal injuries should be adequately fixed by the appropriate collar or neck splintage. An injured limb should be properly splinted so that no further damage is done during transportation. During transportation, a burnt patient, especially infants and children should be kept well covered to avoid excessive heat loss and resulting hypothermia.

The data on the burden of the burn injuries in India is either inaccurate or inadequate. There have been so many studies conducted earlier to study the spectrum of burn injuries.

Nadkarni et al (2017) reviewed medical records of burn patients. There were 170 patients with burn injuries. Prevalence of suicidal burns was 12.9% and of accidental burns was 87.1%. A major proportion of total burn injuries were accidental in nature occurring in the age group of 26 - 50 years (46.5%) and were in females (67.1%).

Nearly 77.6% of burn patients were from rural areas. A major proportion of accidental burns were caused by flame namely stove

burst followed by liquid petroleum gas leakage. Total body surface area involved was higher in suicidal burns (86.4%) as compared to accidental burn injury. A major proportion of accidental burns patients (54.1%) survived and were discharged from the hospital, whereas the major proportion of suicidal burns patients (86.4%) died in the hospital².

Dhopte et al (2017) studied epidemiological data on pediatric burns in India. There were a total of 475 patients involved in the study, including seven suicidal burns, all of whom were females with a mean age greater than the cohort average. Age, type of burns, mode of injury, presence or absence of inhalation injury, gender and time of year (quarter) for admission were found to independently affect the TBSA involved⁶.

Electrical burns also formed an important number of presenting burn patients, mainly involving teenagers. Several societal issues have come forth, e.g., child marriage, childlabour, and likely psychological problems among female children as suggested by a high incidence of suicidal burns. This study also highlighted several issues such as overcrowding, lack of awareness, dangerous cooking practices, and improper use of kerosene oil. There is an emergent need to recognize the problems, formulate strategies, spread awareness, and ban or replace hazardous substances responsible for most burn accidents⁶.

Subrahmanyam (1996) analyzed data on 175 patients in a prospective study. In this series, adolescents and young adults (11–40 years) comprised 79.4 percent of the patients. Males formed 43 percent and females 57 percent of the total burns. 92 percent of the burns occurred at home. 86.8 percent of the patients belonged to low socioeconomic groups. 47.4 percent of them were house-wives or housemaids. 44.6 percent of burns occurred during the morning hours from 6 a.m. to 12 noon. 79.4 percent of the burns were accidental in nature. Flame burns accounted for 92 percent, scalds for 5.7 percent of the total. 64.5 percent of the patients were admitted within 4 h of injury. The overall mortality rate was 56.5 percent, below 40 percent surface area burned (%BSAB), it was 6.1 percent and above 70 percent BSAB it was 100 percent. Flame burns resulted in maximum deaths (86.1 percent). 40 percent of the patients had more than 70 percent BSAB burns in this series, which accounts for the high mortality⁷.

Deshpande et al (2012) studied some of the important epidemiological factors in relation to burn cases at a tertiary care level teaching hospital in rural area. Overall female burn patients were significantly higher than male ($\chi^2=6.480$, $p=0.01$)⁸.

Majority of female patients (68.64%) had total burn surface area more than 35% whereas 48.70% of the male patients had a total burn surface area more than 35% ($\chi^2=7.99$, $p=0.005$). Superficial to deep burns were present in 97% of patients. Majority (80%) of the burn injuries were allegedly accidental. Thermal burn was the commonest cause of burn followed by scalds. In majority of the patients (91.8%) burns were caused by flame and occurred at home⁸.

SUMMARY

This prospective study was aimed to determine spectrum of burn injuries in the patients admitted in Medical College of hilly region of North India. A total of 239 patients were included in the study after they followed inclusion and exclusion criteria. The study results have been summarized below:

In the present study, the patient's age ranged from 10 days to 90 years with the mean age of 27.69 years. It was observed that 31.38% patients were aged less than 18 years. Among these patients, 13 patients were less than a year-old. There were 16 patients who aged more than 60 years.

Male outnumbered females with a ratio of 1.95 to 1.

Among the 239 patients, 125 patients were married while 114 patients were unmarried. Among the 81 females, 39 females were married.

The majority of the patients were dependent (n=94) followed by laborers (n=70), housewife (n=31), electrician (n=17), farmers (n=15), and cook (n=9). Only one patient was unemployed.

Among the 239 patients, the majority of the patients (n=87) were injured during winter season while 36 patients injured during the

summer season. The present study observed that 111 patients sustained burn injury due to flame followed by scald (n=68), electricity (n=41), and contact (n=15). Four patients sustained burn due to chemical means. All the 4 patients sustained burn due to chemical spillage (H₂SO₄) from battery. Among the patients with contact burns, 12 patients suffered the injury due to Bukhari and the remaining patients injured due to electric heater. In electric burn patients, the majority of the patients (n=24) succumbed injury due to electric wire. In flame burns, 29 patients burnt due to fuel and 27 patients due to stove. 154 patients sustained second-degree burn followed by first-degree burn in 53 patients. Thirty-two patients sustained third-degree burn.

In 2 patients, >80% total body surface area was affected. In 66 patients, only <10% TBSA was affected.

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