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Spectrum of Burn Injuries at Indira Gandhi Medical College, Shimla (H.P.)

Dr.Vikas Singh[1],Dr.D.K.Verma[2],Dr.Parikshit Malhotra[3],Dr.Digvijay Singh Thakur [4],Dr. Ashish Thakur[5]

1 Senior Resident Department of General Surgery RKGMC Hamirpur.
2 Professor Department of General Surgery IGMC Shimla
3Associate Professor Department of General SurgeryNSCBMC Mandi
4Senior Resident Department of Neuro Surgery NIMHANS Banglore
5M.O.General Surgery Civil Hospital Rajgarh
Corresponding Author- Dr.Ashish Thakur

Abstract-

Introduction*-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.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.*

Methods-*This was a three and a half years' retrospective and prospective study and included all patients of burn injuries who were admitted in IGMC Shimla from 1st January 2014 to 30th June 2016 and patients who either reported to the Casualty OPD or were admitted in the wards of IGMC Shimla from 1st July 2016 to 30th June 2017.Percentage of Burnwas calculated by using Lund and Browder chart.Inj. Tetanus toxoid and painkillers such as tramadol were given to all patients. Intravenous fluids were administrated according to parklands formula(3-4 ml/kg/TBSA, 1/2 in first 8 hours and rest in next 16 hours) to patients of burns >10% total burn surface area(TBSA) in children <12 years of age and >20% TBSA in adults. Intravenous or oral antibiotics were given depending on the severity of the burn. Patients with respiratory distress were given oxygen support.*

Result-*In our study we found that maximum patient who underwent burn injury is <18 years and are male , married , unemployed .Most common type of burn are flame urns and second degree burns are most common one. Most of burns are accidental burns with epilepsy , diabetes and stroke are associated co- morbidities predisposing patients for burn injuries.Most common organism associated in pus culture following burn is staph aureus followed by pseudomonas.*

Conclusion-*In a patient with burns, medicolegal aspect should be never ignored. A patient of burns should be transported to the hospital immediately and ATLS protocol should be followed at all timesAlways remember maintenance of airway, fluid balance, urine output and normothermia are the most critical steps in the management of patients with burns.Separate burns unit and ICU should be made in tertiary care centers. Surface cultures, blood cultures, urine cultures should be sent regularly according to the hospital protocols and therapy guided by their reports.Patients suffering from neurological disorders such as epilepsy should take precautions while in the vicinity of heating appliances.*

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I. Introduction

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 is a public health problem, accounting for an estimated 265,000 deaths annually throughout the world.[2] 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. Majority of burns were found to be caused by flame and scald. It has also been observed that scald burns are the most common cause of burn injury and flame burn being the second most common cause of injury in pediatric age group. The flame burn was the

most common cause among the female patients whereas electric burns were common among the male patients. 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 our institution in the past, 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).

II. Methods

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

This study was conducted in the Department of General Surgery in IGMC, SHIMLA.This was a three and a half years' retrospective and prospective study and included all patients of burn injuries who were admitted in IGMC Shimla from 1st January 2014 to 30th June 2016 and patients who either reported to the Casualty OPD or were admitted in the wards of IGMC Shimla from 1st July 2016 to 30th June 2017.All patients of all age groups who reported in IGMC after 1st July 2016, underwent a primary survey and concomitant resuscitation as per ATLS guidelines. A detailed secondary survey and detailed history from the patient or attendants was taken regarding the time and circumstances of burns.Percentage of Burn was calculated by using Lund and Browder chart.Inj. Tetanus toxoid and painkillers such as tramadol were given to all patients. Intravenous fluids were administrated (3-4 ml/kg/TBSA, 1/2 in first 8 hours and rest in next 16 hours) to patients of burns >10% total burn surface area(TBSA) in children <12 years of age and >20% TBSA in adults. Intravenous or oral antibiotics were given depending on the severity of the burn. Patients with respiratory distress were given oxygen support.Depth of Burnwas assessed clinically:

- Superficial burns- painful but do not blister.
- Partial thickness burns- have dermal involvement and extremely painful with weeping and blisters.
- Deep burns- hard, painless and non-blanching.

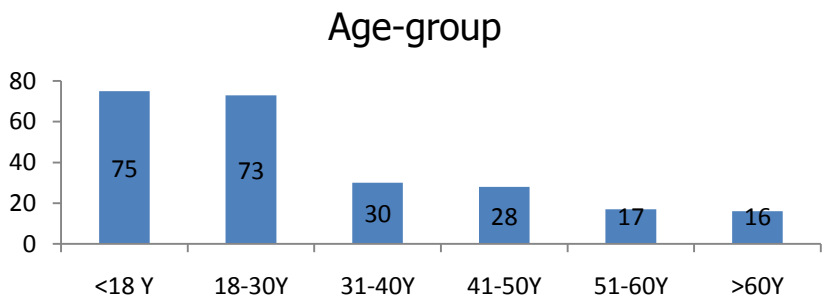
The following patients of all age groups were admitted

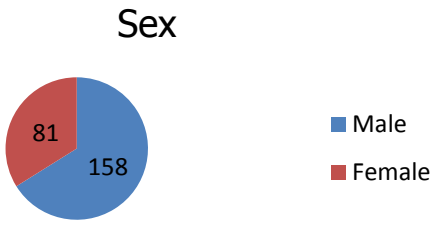
- Suspected airway or inhalational injury.
- Burns likely to require fluid resuscitation.
- Burns likely to require surgery.
- Patients with burns of any significance to the hands, face, feet or perineum.
- Patients whose psychiatric or social background makes it inadvisable to send them home.
- Burn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

The detailed history, examinations, investigations and relevant data were recorded as per proforma attached and analyzed statistically. Variables Such as age, sex, place of occupation, occupation, education, marital status, time of occurrence, cause, and type of burn were presented as frequency and percentages.

III. Results

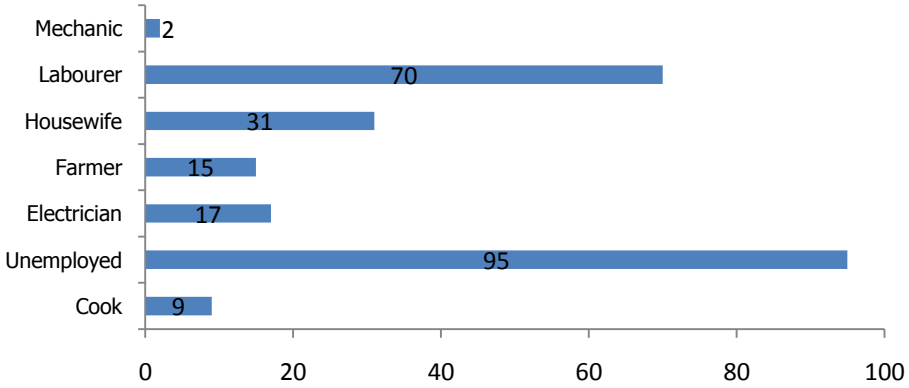
Age and Sex-



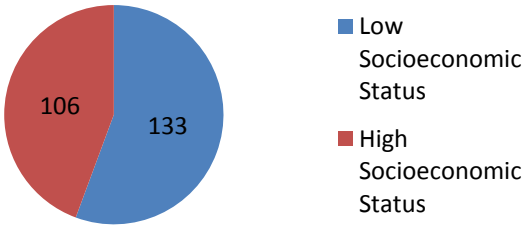


Among the 239 patients, 125 patients were married while 114 patients were unmarried.

Occupation-



Socioeconomic status-



Type of Burn Injury

Type of Burn Injury	Number of Patients
Chemical	4
Contact	15
Electric	41
Scald	68
Flame	111

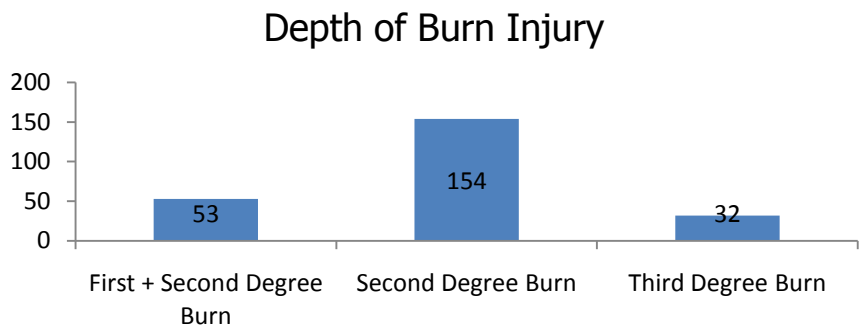
Cause of burn injury-

	Chemical (n=4)	Contact (n=15)	Electric (n=41)	Flame (n=111)	Scald (n=68)
Battery	4	-		-	-
Electric Heater	-	3	-	14	-
High Voltage	-	-	31	-	-
Low Voltage			10		
Forest Fire	-	-		16	1
Fuel	-	-	-	29	3

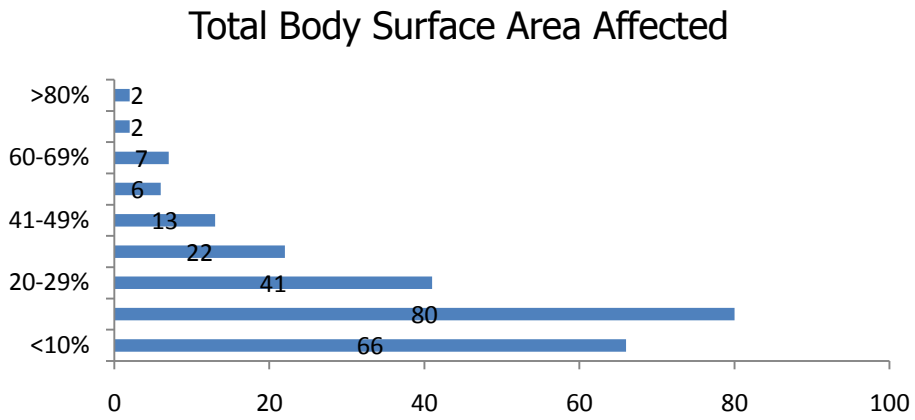
Hot Water	-	-	-	-	38
Lamp	-	-	-	3	2
Liquid	-	-	-	-	19
LPG Cylinder	-	-		21	-
Bukhari	-	12	-	-	-
Pressure Cooker		-	-	-	4
Stove				7	1
Residential Fire	-	-	-	20	

Fuel was the most common cause of flame burn in 29 patients followed by LPG cylinder (n=21), residential fire (n=20) forest fire (n=16), and electric heater (n=14).Hot water and liquid were the most common cause of scald in 38 and 19 patients respectively.the patients with chemical burns (n=4), battery was the cause of burn in all cases. 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 the major cause of injury in 31 patients followed by low voltage in 10 patients.

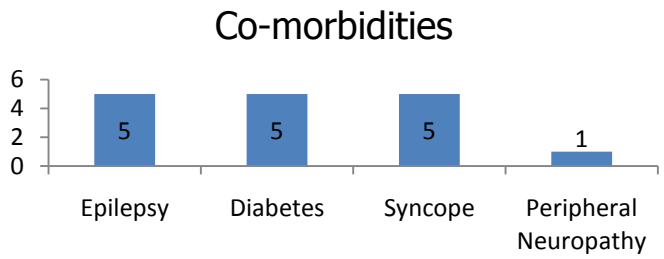
Degree of Burn Injury-



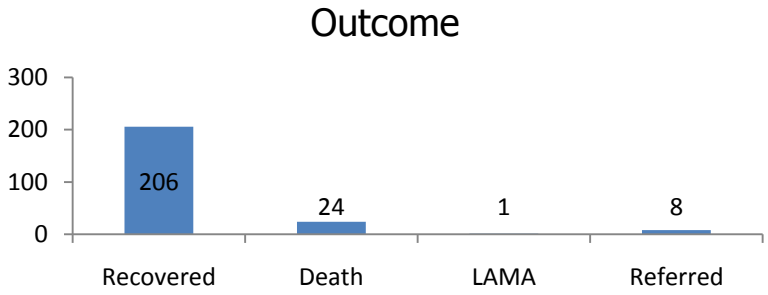
Total body surface area affected-



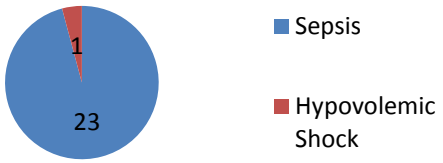
Among the 239 patients, 6 patients also sustained airway burn. 16 patients also had co-morbidities including epilepsy, diabetes, and syncope in 5 patients each, and peripheral neuropathy in one patient .

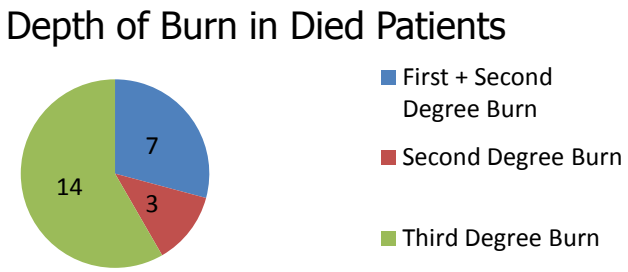


Outcome-



Cause of Death-





Surface/Pus culture analysis at the time of admission revealed that the culture was sterile for 155 patients. *Staphylococcus aureus* was identified in 30 patients followed by Pseudomonas in 20 patients. *E. coli* was present in the surface culture of 11 patients.

IV. Discussion

Age and Sex

In the present study, it was observed that the patients' age ranged from 10 days to 90 years with the mean age of 27.69 years. The present study's results are in concordance with Ahmad et al who showed that mean age of the burn patients was 19.21 years.[3]Itwas also observed that burn injuries were more among males in comparison to females, reflecting the strong influence of gender on the risk of injury. Male dominance over females has also been shown previously by Karimi et al[4] and Ahmad et al.[3]

Occupation and Socioeconomic Status

The present study also observed that the majority of the patients were unemployed followed by laborers, housewife, electrician, farmers, and cook. Among the unemployed group of patients, 94 patients were students. Wardhana et al studied the sociodemographic characteristics of burn patients. They found that 33.1% patients were in "not working" category; however, in this category, they also included pediatric patients. The

present study results are also in concordance with the study as in this study, the majority of the burn patients were unemployed.[5]

Causes

The present study showed that burn injuries were the most commonly caused by flame. This finding is similar to the other studies.[6,7] The second most common cause of burn in the present study was scald burn, which is more common among the pediatric population. A systemic review of the epidemiology of unintentional burns in South Asia by Golshan et al. also reported flames and scalds as the two most common modes of injury.[8]

Degree of Burn

It was found that 154 patients succumbed to second-degree burn while first + second-degree burn was present in 53 patients. Only 32 patients sustained third-degree burn. It was also observed that in 2 patients, >80% total body surface area was affected. In 66 patients, only <10% TBSA was affected.Khan et al studied the epidemiology of various demographic characteristics, outcome, and prevention in 110 burn patients. They found that 56.3% of patients had mixed degrees of burns, and 22.7% had third degrees of burns.[9] Gupta et al analyze the causes, demographic and socio-cultural aspects, and the magnitude of burn injuries prospectively and to evaluate the outcome of treatment of patients admitted to burns ICU of a tertiary care hospital. They found that 53% patients sustained major two to three-degree flame burns involving more than 45% of total body surface area.[10] Variability of our results with other studies could be due to sample size, type of injury, and other factors.

Co-morbidities

It was found that among the 239 patients, 6 patients also sustained airway burn. Sixteen patients also had co-morbidities including epilepsy, diabetes, and syncope in 5 patients each, and peripheral neuropathy in one patient. Thombs et al looked at the effect of various co-morbidities on burn injury mortality based on the National Burn Repository (NBR) report on 31,338 burn records from 1995–2005. They found that various pre-existing medical conditions, using the Charlson Comorbidity index and Elixhauser method of comorbidity measurement, affected burn mortality. Medical conditions such as HIV/Aids, metastatic cancer, liver disease, and renal disease had a poor prognostic outcome in acute burn injury.

Culture

Surface/Pus culture analysis revealed that the culture was sterile for 155 patients. *Staphylococcus aureus* was identified in 30 patients followed by Pseudomonas in 20 patients. *E. coli* was present in surface culture of 11 patients. Blood culture was sterile for 206 patients while *S. aureus*, Klebsiella, and *E. Coli* was identified in 20, 5, and 4 patients. Forson et al determined the microbial profile of burn wounds. Out of the 50 samples analyzed, 86% were culture positive and 14% were culture negative for bacteria. The predominant organisms isolated were Pseudomonas sp. (30.2%) and Acinetobacter sp. (20.9%). *Proteus mirabilis* (2.3%) and *Staphylococcus aureus* (2.3%) were the least frequently isolated bacteria.[11]

V. Conclusion

In a patient with burns, medicolegal aspect should be never ignored. A patient of burns should be transported to the hospital immediately and ATLS protocol should be followed at all times Always remember maintenance of airway, fluid balance, urine output and normothermia are the most critical steps in the management of patients with burns.The inhalational injury is a major factor in increasing the burden of morbidity and mortality due to burns. It requires quick recognition and urgent airway management. Noradrenaline, heparinized saline, endotracheal tubes and tracheostomy sets should be made available at all hospitals so that airway is secured urgently in this group of patients Separate burns unit and ICU should be made in tertiary care centers. Surface cultures, blood cultures, urine cultures should be sent regularly according to the hospital protocols and therapy guided by their reports. Patients suffering from neurological disorders such as epilepsy should take precautions while in the vicinity of heating appliances.It should be recognized that burns are a separate complex medical entity requiring multimodal care and rehabilitation. Separate burns center is the need of the hour in care of these patients as it is a major cause of morbidity and mortality.

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