

Original Research Article

Study Showing Sepsis and Outcome Following Burn Injury at Tertiary Health Care Centre

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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 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 administered 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 is flame burns and second degree burns are most common one. 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. The present study also observed that among 24 patients who died, 23 died due to sepsis and one patient died due to hypovolemic shock. Inhalation burn was also an associated cause in these 24 patients. Among 24 died patients, 14 patients had 3rd-degree burn while 3 patients sustained 2nd-degree burn. Blood culture at the time of admission revealed was sterile for 176 patients while Staphylococcus aureus, Klebsiella, and E. Coli was identified in 20, 5, and 4 patients. **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. 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. Many patients have surface and blood cultures sterile, but few patients who went into sepsis have high level of morbidity and mortality. So, it is wise to manage each burn patient seriously in a dedicated burn unit or burn center.

Keywords: Sepsis, Burn Injury, Tertiary Health.

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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. The present study was conducted to measure the sepsis rate, involved organism in the sepsis and outcome following burn injury. It may help us to plan strategies to prevent burns and s to minimize its morbidity, disability, and mortality and disability-adjusted life years.

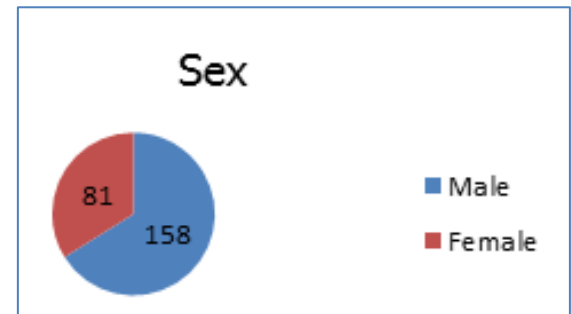
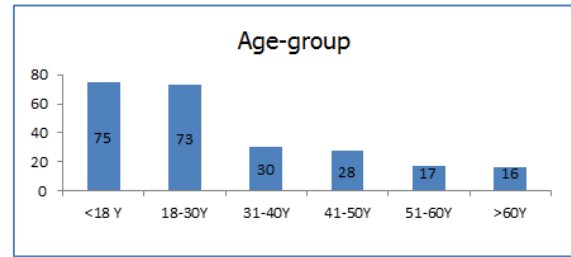
METHOD

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. Blood investigations, surface and blood cultures sent as per need. Patients with respiratory distress were given oxygen support. Depth of Burn was 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.

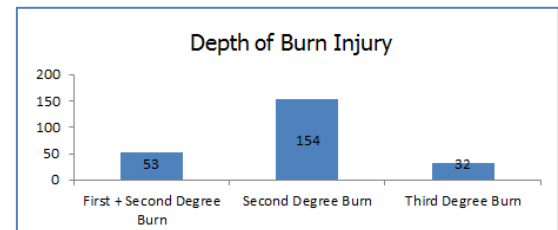
RESULTS

Age and Sex

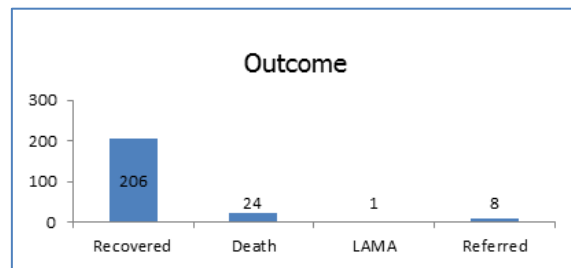
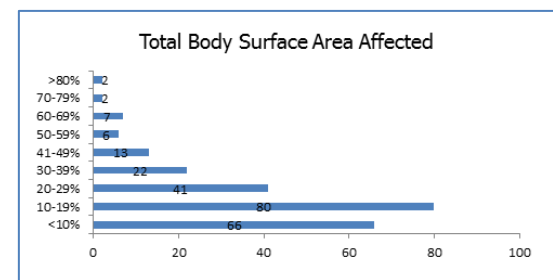


Among the 239 patients, 125 patients were married while 114 patients were unmarried.

Degree of Burn Injury

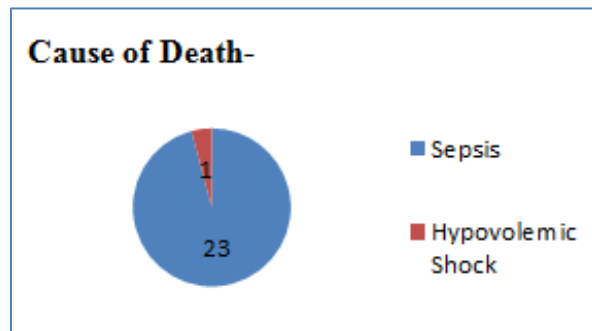


Total body surface area affected

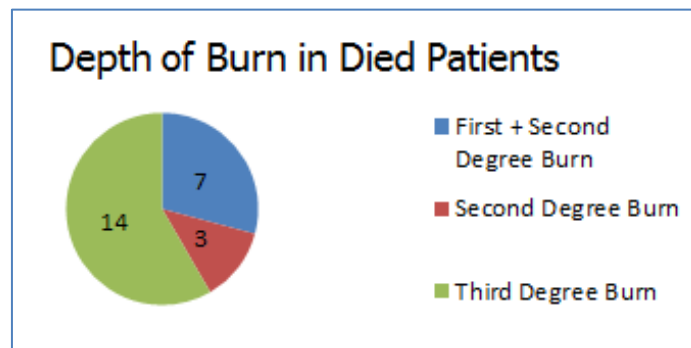


The present study also observed that among 24 patients who died, 23 died due to sepsis and one patient died due to hypovolemic shock. Inhalation burn was also an associated cause in these 24 patients (3 patients

along with sepsis and one patient along with hypovolemic shock)

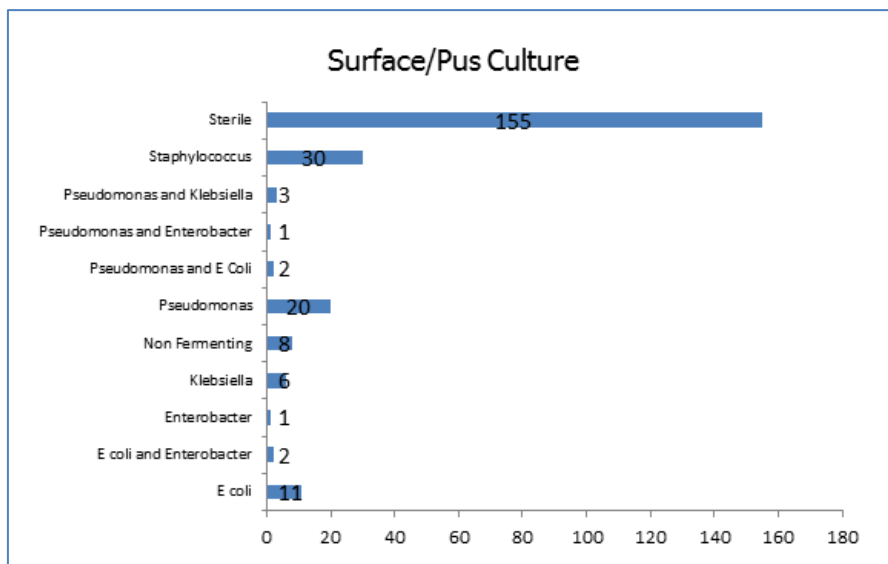


Among 24 died patients, 14 patients had 3rd-degree burn while 3 patients sustained 2nd-degree burn.



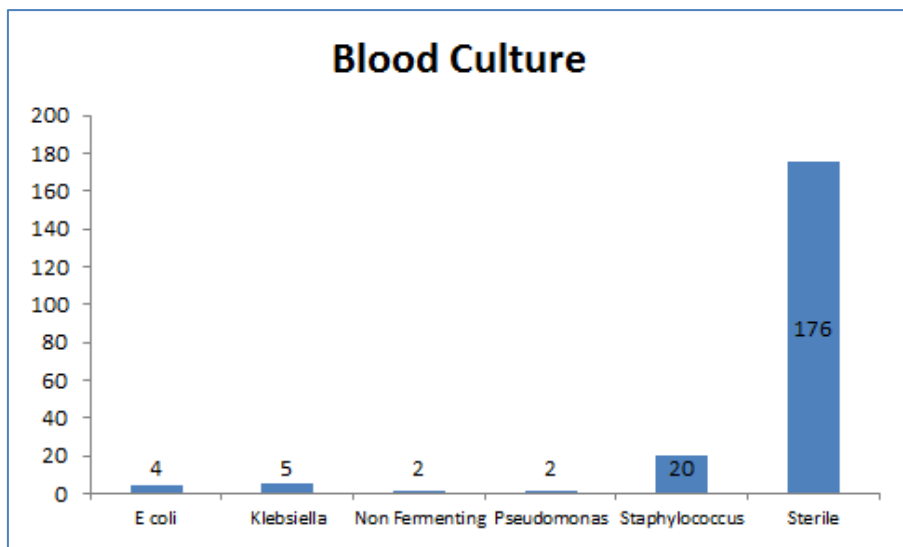
Surface/Pus culture analysis at the time of admission revealed that the culture was sterile for 155 patients. *Staphylococcus aureus* was identified in 30

patients followed by *Pseudomonas* in 20 patients. *E. coli* was present in the surface culture of 11 patients.



Blood culture at the time of admission revealed was sterile for 176 patients while

Staphylococcus aureus, *Klebsiella*, and *E. Coli* was identified in 20, 5, and 4 patients.



Total leukocyte count was performed for 233 patients. Among these patients, 149 patients' TLC was within normal limits (4000-11000). Leukopenia was observed in 3 patients while TLC was higher in 81 patients.

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]. It was 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].

Causes

The present study showed that burn injuries were the most commonly caused by flame. This finding is similar to the other studies [5, 6]. 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 [7].

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

[8]. 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 [9]. Variability of our results with other studies could be due to sample size, type of injury, and other factors.

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 [10].

Outcome

Fazeli *et al.* found those who have affected more than 30% TBSA; 50% of them are likely to die. More is the severity of burn; it may result in high mortality [11].

Taylor *et al.* hypothesized that age variably impacts mortality after burn and that age-specific models for children, adults, and seniors will more accurately predict mortality than an all-ages model [12].

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. 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. Many patients have surface and blood cultures sterile, but few patients who went into sepsis have high level of morbidity and mortality. 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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