



## International Journal of Research in Pharmacology & Pharmacotherapeutics



ISSN Print: 2278-2648

IJRPP | Vol.5 | Issue 4 | Oct - Dec - 2016

ISSN Online: 2278-2656

Journal Home page: [www.ijrpp.com](http://www.ijrpp.com)

Research article

Open Access

### Epidemiology of Burn Injuries across Andhra Pradesh and the Practice of Systemic Antibiotic Prophylaxis

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#### ABSTRACT

##### Background

Trauma due to burns is a significant cause of injury worldwide. Ninety percent (90%) of the burn injuries are preventable but in a developing country like India, burn injuries continue to be a challenging problem. Among the burns patients infections arising from multiple sources delay the wound healing process, increase scarring and invasive infection may result in the death of the patient.

##### Materials & Methods

A retrospective study, on patients admitted in the Plastic surgery Departments of various Network Hospitals of Dr.NTRVST was conducted from January 2015 to September 2016. Data regarding the patient's age and sex, etiology, timing of burn injury, place of burn, Total body surface area (TBSA) involved, Antibiotic regimen and mortality were collected and analysed.

##### Results

We observed that flame was the most common cause of the injury (n=213, 78.30%). Highest incidence of burns was seen in the age group 21-30 years (33.09%). Male to female ratio observed in our study was 0.7:1. Ceftriaxone, Amikacin and Metronidazole are the common systemic antibiotics used for treating burns patients. The mortality rate was 39.33 %, out of 107 deaths, 97(87.85) patients had >45% TBSA burn and 13 patients had 14-45%.

##### Conclusion

We can conclude that domestic and peri-domestic burn is totally preventable and manageable. This basic education should be imparted from the primary school level and reinforced at every level till graduation of a person. The innovative approaches can include a broad theme "how one can save himself/ herself and others from burns at home or work place."

**Keywords:** Burn patients, Mortality, Prevention

## INTRODUCTION

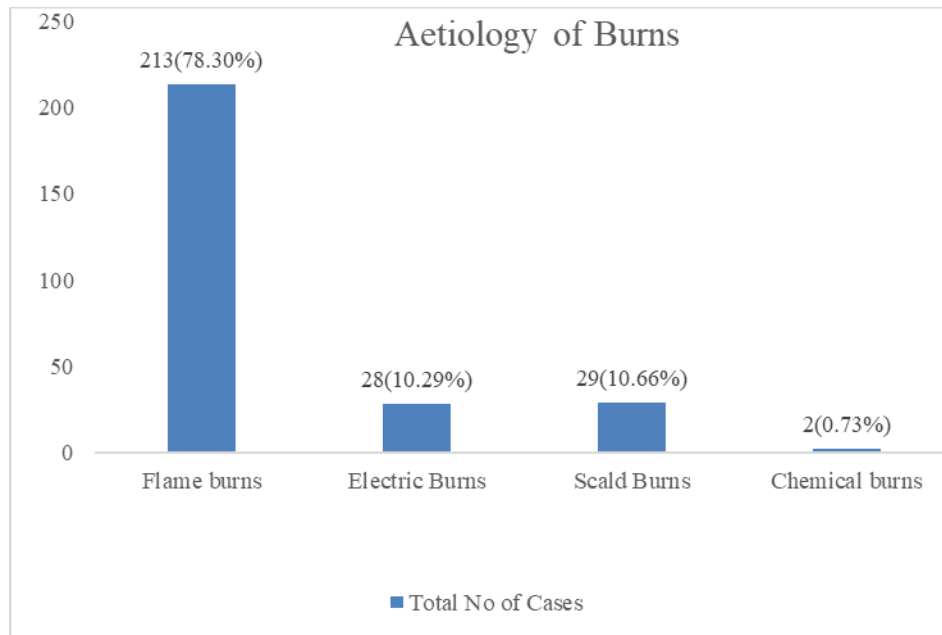
Trauma due to burns is a significant cause of injury worldwide. The World Health Organization (WHO) estimates that the lifetime incidence of severe burns is 1% [1] and that more than 300,000 people die annually from fire-related burns worldwide [2, 3]. In addition, the prevalence of burns is significantly higher in developing countries compared to developed countries. Indian society where 70% of the people are in rural areas and still relies on old means of making food like a stove, using wood, coal and kerosene as the main source of energy etc. These are unsafe and result in frequent fire explosions. [4] Ninety percent (90%) of the burn injuries are preventable but in a developing country like India, burn injuries continue to be a challenging problem due to poor medical facilities, lack of specialist doctors, and absence of public awareness [5]. Among the burn patients infections arising from multiple sources delay the wound healing process, increase scarring and invasive infection may result in the death of the patient [6, 7]. With the aim of reducing the risk of infection in burn patients various antibiotics are used locally on the skin (topical treatments), others are taken orally, or by injection, and affect the whole body (systemic treatments) [7, 8]. Due to the damage to the skin and other organs burns can lead to open wounds, disability, death, significant economic consequences, severe emotional and psychological complications to the victims and his family. Also, due to high cost involved for the treatment of burn restricts the family of the victims to take the patient to a higher health centre. [5] Therefore, burn patients require not only acute primary treatment but also subsequent rehabilitation, reconstruction and long-term anti-scar therapy. [9] The aim of this study is to assess the prevalence of various types of burns and to evaluate the causes, manner, place of occurrence of burns injuries along with its outcome, and common antibiotics prophylaxis followed.

## MATERIALS AND METHODS

A retrospective study was carried out between January 2015 to September 2016 on patients admitted with burn injuries in plastic surgery departments of the network hospitals empanelled under Dr. NTR Vaidya Seva Trust. The State Government of Andhra Pradesh is implementing a health scheme known as Dr NTR Vaidya Seva for below poverty line families (BPL) where treatment is given free of cost for 1044 procedures. The trauma care is provided free of cost under this scheme. The medical records of patients who received free cashless treatment under Dr.NTRVST were studied. Data regarding the patient's age and sex, etiology, timing of burn injury, place of burn, Total body surface area (TBSA) involved, systemic antibiotics used and mortality were collected and analysed.

## RESULTS

The present study data of a total of 272 patients was analysed for the following factors like age, aetiology, TBSA%, mortality etc., and reported in the form of frequencies and percentages. We observed that flame was the most common cause of the injury (n=213, 78.30%) **Fig 1.** Highest incidence of burns was seen in the age group 21-30 years (33.09%). Male to female ratio observed in our study was 0.7:1. Female predominance in burn injuries was noticed in our study where 55.88% patients were Females and 44.11% were males. Majority of the patients suffered burns involving greater than 45% of their Total Body Surface Area (n=163, 59.92%) **Tab 1.** 76.10% patients sustained accidental burns while 22.42% and 1.47% sustained suicidal and homicidal burns, respectively. **Fig 2** The mean hospital stay was consistent with the degree of burns, with patients having > 45% Total Body Surface Area (TBSA) burns having longer hospital stay. The mortality rate was 39.33 %, out of 107 deaths, 97(87.85) patients had >45% TBSA burn and 13 patients had 14-45%. **Tab 2.** Routine systemic antibiotics for burns patients followed for adults and paediatrics are Ceftriaxone, Amikacin and Metronidazole. **Tab 3.**



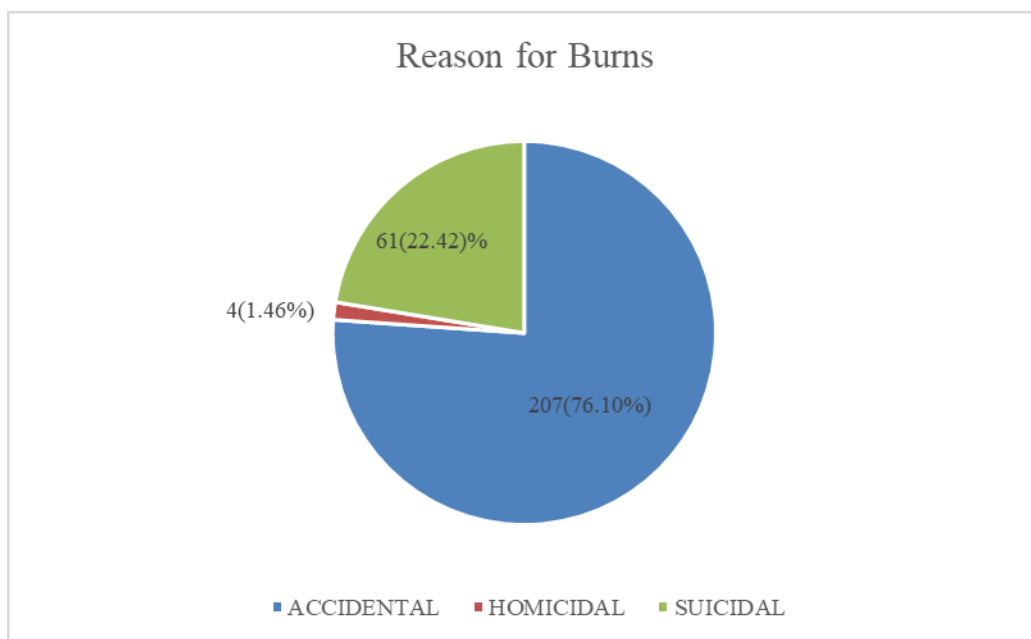
**Figure 1 Aetiology of Burns**

**Table 1 Descriptive statistics**

Gender	Frequency (%)
F	152(55.88)
M	120(44.11)
<b>Grand Total</b>	<b>272(100)</b>
<b>Age</b>	
0-12	26(9.56)
13-20	39(14.34)
21-30	90(33.09)
31-40	59(21.69)
41-50	28(10.29)
51-60	15(5.51)
>60	15(5.51)
<b>Grand Total</b>	<b>272(100)</b>
<b>TBSA</b>	
<15	3(1.10)
15-45	106(38.97)
>45	163(59.92)
<b>Grand Total</b>	<b>272(100)</b>

**Table 2 Mortality vs Gender and Total Body Surface Area**

TBSA	Mortality	
	No (%)	Yes (%)
<15	4(2.42)	0(0)
>45	69(41.81)	94(87.85)
15-45	92(55.75)	13(12.14)
Grand Total	<b>165(100)</b>	<b>107(100)</b>
<b>Gender</b>		
Female	83(50.30)	69(64.48)
Male	82(49.69)	38(35.51)
Grand Total	<b>165(100)</b>	<b>107(100)</b>



**Figure 2 Reason for burns**

**Table 3: Routine Antibiotic Prophylaxis for Burns Patients**

Generic Name of the Drug	Dosage	
<b>Inj. Ceftriaxone</b>	Neonates; 0-7 days old	50 mg /kg im/iv q 24 hr
	Neonates; > 7 days old ;< 2000gms	50 mg/kg im/iv q 24 hr
	Neonates ;> 7 days old; > 2000gms	50-75 mg/kg im/iv q 24 hr
	Infants /children	50-100 mg/kg/day im/iv divided q 12-24 hr
	Adults	1gm iv 12 hourly
<b>Inj. Amikacin</b>	15 mg/kg/day divided iv/im q 8-12 hour	
<b>Inj. Metronidazole</b>	500mg/100ml intravenous infusion	

## DISCUSSION

The aetiology and nature of burn injuries varies significantly by different communities. As India is a country of diverse cultures and societies and every society has, its own epidemiological characteristics. Epidemiological studies become more important in such diversities, so that based on these studies, definitive preventive and educative programs can be started aiming at a target population who is at risk of sustaining burns. The present study was conducted on 272 burn patients admitted in the burn wards of various Network Hospitals of Dr NTR Vaidya Seva in all 13 districts of the Andhra Pradesh. We observed that flame was the most common cause of the injury. In our study highest incidence of burns was seen in the age group 21-30 years. This distribution is similar to those found in Khan AA et al 2007; and Ansari-lari M et al 2003 [10, 11]. High incidence in this age group is explained by the fact that they are generally more active and exposed to hazardous atmosphere at home and at work. [12] This age group also involves newly married women who become victims of bride burning. This can be the result of harassment from parents-in-law or other physical and psychological stresses of marriage. [13, 14] This high incidence of thermal burns is similar to Ahuja R and Bhattacharya S. [15] Male to female ratio observed in our study was 0.7:1. Female predominance in burn injuries was noticed in our study where 55.88% patients were Females and 44.11% were males, similar to the reports from other regions of India. Ghaffar et al and Haralkar et al [16, 17] have reported a male to female ratio of 0.9:1 in Aligarh, Uttar Pradesh, and 0.5:1 in Solapur, Maharashtra. Most of the females involved were housewives who spend most of their time working in kitchen. Moreover, an average Indian family is ignorant about safety measures and still follows old traditional methods of cooking. All these situation makes women more susceptible to burns. [18] In our study, 76.10% patients sustained accidental burns while 22.42% and 1.47% sustained suicidal and homicidal burns, respectively. These figures are comparable to study by Mashaly AM [17] in Indian set up, suicidal burns in married women are on an increase probable out of desperation due to marital disharmony or dowry harassment resulting in physical and psychological stresses. [18] Homicidal burning of married females is similarly common, as

well. But these women, because of fear from in laws, do not name marital disharmony or dowry as the reason behind burns but instead blame it on some accidental reason as cause of their burns. The interesting finding of this study was change in statements made by the cause of burns. Due to pressure of relatives and because of anxiety, patients initially confess to have sustained accidental burns. But when they realize the seriousness of their illness and fate they are going to meet, patients disclose the real cause of burns. [19] The mean hospital stay was consistent with the degree of burns, with patients having > 45% Total Body Surface Area (TBSA) burns having longer hospital stay. To maintain haematological profile of burns patients, blood transfusions were given wherever indicated. The most common indication for blood transfusion was anaemia, as characterized by haemoglobin levels of less than 10 g/dl %. The most common surgical procedure done in these patients was skin grafting for post burn raw areas. In this study Split-Thickness Skin Graft (STSG) was more commonly performed followed by fasciotomy. Early excision and skin grafting of deep burns is far superior over conventional treatment. It reduces infective complications, reduces mortality, shortens hospital stay, and improves functional outcome. [20] The mortality rate in our study was 39.33 %, out of 107 deaths, 97(87.85) patients had >45% TBSA burn and 13 patients had 14-45% TBSA burns which was comparable with Gupta M et al. [21]. In our study we noticed that Ceftriaxone, Amikacin and Metronidazole are the common systemic antibiotics used for treating burns patients for 7-10 days. Depending upon the culture and sensitivity results on 4<sup>th</sup> to 5<sup>th</sup> day medication and dosage are changed. Although in burns patients' the incidence of acquired infections common to other patients in intensive care units such as intravascular catheter related infections and ventilator associated pneumonia, is higher, the use of antibiotic prophylaxis suggests possibly similar benefits of reduced mortality. [8] Nevertheless, several systematic reviews suggest that for patients with severe burns, prophylaxis with systemic antibiotics is currently not recommended other than perioperatively, indicating the need for randomised controlled trials to assess its use. [6, 8, 22] The major reason for mortality was cardiac arrest and septicaemia which was seen in 52.3% and 25.3% patients, respectively. Burns remains a huge public

health problem in terms of morbidity and long-term disability, as patient with septicaemia must undergo amputation to prevent the further spread of infection, contracture, and psychological distress. We can conclude that domestic and peri-domestic burn is totally preventable and manageable. This basic education should be imparted from the primary school level and reinforced at every level till

graduation of a person. The innovative approaches can include a broad theme “how one can save himself/ herself and others from burns at home or work place.” There is a need to do more analytical studies into the causes of death and time interval between injury and admission and treatment initiation.

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