



# The Distribution and Determinants of Burn Injuries at Jinnah Burn and Reconstructive Surgery Centre, Lahore

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## ABSTRACT

**Introduction:** Burn is an important cause of morbidity and mortality in underdeveloped countries. In Pakistan, epidemiology of burn injuries is inadequately focused due to lack of burn database. **Aims & Objectives:** To determine the epidemiological distribution, determinants and outcome of burn injuries among patients admitted at Jinnah burn and reconstructive surgery center, Lahore, Punjab, Pakistan. **Place and duration of study:** Jinnah Burn & Reconstructive Surgery Centre, Jinnah Hospital Lahore, Pakistan, from May 2016 to March 2017. **Material & Methods:** Medical records from May 2016 to March 2017 were reviewed. 264 patients admitted in burn center through emergency or outpatients were included. Patient demography and factors like age, percentage of burn, ward and ICU stay, type of treatment etc. were noted. **Results:** Out of 264 cases, males were 63.6% (n=168) and females were 36.4% (n=96). The largest number of the cases belonged to the youngest age category of less than 25 years, i.e. 135 (51.5%), and 92% were less than 50 years of age. Most of the cases were accidental (93.3%). Patients were received from as far as Noshki (Baluchistan). The cases of flame burn were 75.6% (n=200), electric burn were 9.0% (24), and the rest included scald burn and chemical burn. Skin grafting was done in 28% (74) of cases. Out of the total, 51.1% (135) of the patients had less than 30% total body surface area (TBSA) burns. Mean stay in our center was  $11.5 \pm 6.57$  SD days. Mortality rate was 34.8% (92). **Conclusion:** Burn injuries are predominantly affecting male gender and younger age group. Flame injuries are most prevalent cause of burn injuries with high mortality rate in our region.

**Key words:** Burns, epidemiology, mortality, burn injuries, TBSA (Total Body Surface Area).

## INTRODUCTION

Burn is a worldwide issue especially in developing country like Pakistan and continues to be a major challenge to the health care provider and society. Burn injuries in Low and Middle income countries (LMICs) accounts for 90% of the burns around the world<sup>1,8</sup>. Burns are the fourth leading cause of injury following road traffic injuries, falls, and interpersonal violence. This accounts for 5 - 12% of all injuries worldwide. Every year around 11 million patients required some kind of medical intervention<sup>2,4</sup>. About 265,000 people die each year due to burn injuries according to the World Health Organization (WHO) <sup>5</sup>.

Around two-thirds of burn injuries occur in the African, Eastern Mediterranean and South-East Asia regions of the WHO<sup>6</sup>. According to WHO, annual incidence in the Eastern Mediterranean and South-East Asia regions is estimated to be 187 and 243 per 100,000 populations, respectively<sup>7</sup>. Mortality rate in Pakistan is 5.8 per 100,000 cases according to a study<sup>1,8</sup>. Burn injury is an economic burden as the treatment requires a lot of resources<sup>9</sup>. There has been a steady increase in burn patients and in order to make better prevention policies and treatment protocols the knowledge of epidemiology is a must. Burn is a tissue insult with resultant capillary leakage and tissue necrosis <sup>10</sup>. The types of burns include flame burns, scalds, chemical burns, electric burns and radiation burns. The severity of wounds

depends upon the temperature & time period of exposure, degree & location of burns, and patient age<sup>10</sup>.

Flame burn is the most common cause of burn in adults and its management is a challenge. Due to loss of skin protection in thermal burns, the patients are more prone to infection which leads to increase in depth of burn, sepsis<sup>11</sup> and can be fatal<sup>12</sup>. Some studies have found infections<sup>13</sup> and sepsis<sup>14</sup> as the most prevalent causes of mortality in burn injury patients. Burn care activity is predominantly driven by emergency admissions; although there are a small number of elective cases admitted through out-patient department for acute burn wound management or reconstructive purpose.

Burn injury is an under-researched area in Pakistan despite of its importance. The actual burden of burn injuries on the population cannot be estimated as the current data is not sufficient. The epidemiology of burn injury in the population that does not present to specialized burn centers is also neglected<sup>15</sup>. This research will highlight epidemiological factors and outcome of patients admitted in a major burn center of Lahore over a period of 11 months that can delineate guidelines in prevention and management of burn injuries. It will be helpful in reducing burn related morbidity and mortality rates.

## **MATERIAL AND METHODS**

A cross sectional study was conducted in Jinnah burn and reconstructive surgery center from May 2016 to March 2017. After formal approval from the ethical committee as well as the academic council of the institute, all the files of patients admitted in this time period were withdrawn from data and were studied in detail. Sample size of 254 was calculated from win-pepi software ver: 11.15 to estimate a rate with confidence level of 95% and acceptable difference of 52 per 1000 in assumed rate of burn of 243 per 1000.<sup>7</sup> Demographic details like age, gender along with cause, nature and type of burn were documented. Clinical profile like total burn surface area, type of treatment and skin grafting and outcome were assessed. Data was cross tabulated for type of burn and demographic and clinical profile. Chi-square test was used to assess clinical significance with p-value < 0.05 as statistical significance.

## **RESULTS**

Out of 264 cases, males were 63.6 % (n=168) and females were 36.4 % (n=96). Mean age was  $28 \pm 12.74$  years, with 51.1% (n=135) cases belonging to less than 25 years. 40.9 % (n=108) were 26 to 50 years of age. 8.0 % (n=21) cases were more than 50 years of age. 93.3% (n=249) burn were accidental injury and 6.7% (n=15) burns were of homicidal or self-inflicted burn or suicidal attempt. Type of burn injuries were observed and 75.6% (n=200) patients were victims of flame burn. Electric burn cases were 9.0% (n= 24) while scald burn and chemical burn cases were 15.0% (n=40). (Table-1)

Burn patients were treated conservatively with dressings and antibiotics along with other basic burn management protocols. Different types of biological and synthetic dressings were used, depending on the type and size of the wounds. Surgical debridement, excision of deep wounds and skin grafting was done in 28% (n=74) of the cases. 35.6 % (n=94) of patients were having 11 to 20% TBSA of burn wounds and 15.5% (n=41) patients had 21 to 30% TBSA of burns. (Table-2)

Mean stay of burn patients in our center was  $11.5 \pm 6.57$  days with maximum stay in burn ward was 41 days. Maximum ICU stay of a patient was 30 days (Table-2). 34.8% (n=92) patients expired and among them 54.0% of the cases who expired had inhalational injuries.

Data was cross tabulated for type of burn and demographic and clinical profile. 92.0% of flame burn occurred in < 50 years of age group and 62.5% of male gender. 94% of cases were accidental burn injuries, in which the majority was flame burn (96.5%). The homicidal or suicidal attempts were made either with flame or chemical burn in 5.68% cases. Out of the total patients who had a hospital stay of more than 3 weeks, majority were flame burn cases, while electrical injury cases were the least in number (n=2, 8.4%) who required a longer stay. (Table-3)

The catching areas of the burn patients were observed to be mainly Lahore and areas around this city, but there were cases referred from all over the province and from other provinces as well. The farthest area from where a burn patient came here was Noshki (Baluchistan).

Variables n= 264	Frequency	Percent
<b>Age (yrs.)</b> Mean = 28.0 SD =12.74 Min. age=15, Max. age=75		
< 25	135	51.1%
26 – 50	108	40.9%
51 – 75	21	8.0%
<b>Gender</b>		
Male	168	63.6%
Female	96	36.4%
<b>Nature of burn</b>		
Accidental	249	93.3%
Homicidal / suicidal	15	6.7%
<b>Type of burns</b>		
Flame	200	75.6%
Electric	24	9.0%
Chemical	20	7.5%
Scald	20	7.5%

**Table-1:** Epidemiological factors among burn patients

Variables n= 264	Frequency	Percent
<b>TBSA</b>		
< 30 %	143	54.17%
31 - 60	91	34.47%
> 60 %	30	11.36%
<b>Treatment</b>		
Conservative	253	95.83%
Surgical treatment	137	51.89%
Skin grafting	97	36.74%
<b>Length of stay</b> Mean = 25.65 (days) SD = 7.45 Min = 2 Max-60		
< 3 weeks	230	87.1%
> 3 weeks	34	12.9%
<b>Outcome</b>		
Discharge	172	65.2%
<b>Deceased</b>	92	34.8%

**Table-2:** Treatment and outcome among burn patients

Variables n= 264	Flame (n-200) Frequency (%age)	Electric (n-24) Frequency (%age)	Chemical (n-20) Frequency (%age)	Scald (n-20) Frequency (%age)	P values
<b>Age</b>					
< 25	97 (48.5%)	16 (66.6%)	12 (60.0%)	10 (50.0%)	P = 0.000
26 – 50	87 (43.5%)	7 (29.3%)	6 (30.0%)	8 (40.0%)	
51 – 75	16 (8.0%)	1 (4.1%)	2 (10.0%)	2 (10.0%)	
<b>Gender</b>					
Male	125 (62.5%)	22 (96.1%)	13 (65%)	8 (40%)	P = 0.003
Female	75 (37.5%)	2 (3.9%)	7 (35%)	12 (60%)	
<b>Nature of burn</b>					
Accidental	193 (96.5%)	24 (100%)	12 (60%)	20 (100%)	P = 0.000
Homicidal / suicidal	7 (3.5%)	0 (0%)	8 (40%)	0 (0%)	
<b>TBSA</b>					
< 30 %	95 (47.5%)	18 (75%)	14 (70%)	16 (80%)	P = 0.000
31 – 60	76 (38%)	5 (20.8%)	6 (30%)	4 (20%)	
> 60 %	29 (14.5%)	1 (4.1%)	0 (0%)	0 (0%)	
<b>Length of stay</b>					
< 3 weeks	176 (88%)	22 (91.6%)	16 (80%)	16 (80%)	P = 0.496
> 3 weeks	24 (12%)	2 (8.4%)	4 (20%)	4 (20%)	
<b>Outcome</b>					
Discharge	126 (63%)	20 (83.3%)	14 (70%)	12 (60%)	P = 0.221
Deceased	74 (37%)	4 (14.7%)	6 (30%)	8 (40%)	

**Table-3:** Type of burn and demographic and clinical outcome among burn patients

## DISCUSSION

Burn injuries are a global issue affecting physical, psychological, and economic aspects of victims and their families<sup>16</sup>. We need appropriate structures, standardized processes and practices to improve the survival rates and quality of life for burn patients<sup>17</sup>. Treatment requires a lot of time, expertise and resources.

A study from Wah, Pakistan reported 29.7% death rate in burn patients. In that study, the incidence was more in males (55%) than females<sup>18</sup>. A study conducted in a burn center in Karachi, Pakistan, showed mortality rate of 36.12%<sup>19</sup>, which is comparable to the mortality rate in our study, i.e. 34.8%. The very high mortality rates in major cities of Pakistan are quite alarming. The factors associated with the high mortality rate include late presentation, inappropriate management and inadequate early resuscitation, inhalational injuries, co-morbidities, high percentage of burnt body surface area, depth of burn wounds, infection/sepsis, and age of the patients.

According to NHS (England), approximately 130,000 burn victims visit Emergency Departments annually and approximately 10,000 cases require admission in hospital<sup>20</sup>. Out of these, approximately 500 have severe burn injuries which require fluid-resuscitation<sup>21</sup>. So, even in the developed countries the burden of the burn care is a serious concern.

This study was conducted in the only proper burn center in the capital city of Punjab. It has been observed that burn injuries are most of the times non-intentional, occur due to carelessness, lack of attention or preexisting medical conditions (like epilepsy). Majority of the cases have been found to be accidental in this study. Younger people are most commonly affected. Causes of burn injuries are preventable most of the times, and mortality or morbidity can be reduced by simply adopting the preventive measures.

In this study, domestic burn accidents were found to be very common, e.g., with history of gas leakage in kitchen etc. Open flames used for heating and lighting also pose risks, and self-directed or interpersonal violence are also the contributing factors.

Other common causes of fire in commercial, industrial and domestic areas include faulty wiring and short circuiting. Negligence regarding use of gas-heaters and stoves contributes to the burn

injuries significantly. Cheaper fuel option like compressed natural gas is a source hazard due to lack of standardization and maintenance of cylinders. Leakage of gas from pipes and load shedding of gas is also responsible for many incidents. This study reflects an incomplete picture of the current scenario of burn injuries in our region. The time period of this audit comprises roughly of the first year of this center after becoming operational, during which there were some minor limitations to its functionality. More work is needed to be done in this field.

## CONCLUSION

Burn injuries are predominantly prevalent in male gender and younger age group. Flame injuries are most prevalent cause of burn injuries with high mortality rate in our region.

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