

## Evaluation of Electric Burn Injury Cases Admitted in Burns Centre, Karachi

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### ABSTRACT

**Objective:** To evaluate epidemiology and outcome of patients admitted with Electric Burn injury to Burns Centre, Civil Hospital Karachi; from January, 2006 to December, 2011.

**Background:** An electrical injury occurs when a current passes through the body, interfering with the function of an internal organ or sometimes burning tissue. It accounts for 4% to 6.5% of all admissions to burns units in the United States and for approximately 1000 fatalities per year.

**Methodology:**

**Study Design:** Retrospective Hospital Based Observational Study.

**Place and Duration of Study:** The study was conducted in the Burns Centre, Civil Hospital Karachi (CHK) from January, 2006 to December, 2011.

**Patients and Methods:** The study included electric burn patients, belonging from all age groups, ethnicities and either gender, who were admitted to Burns centre, CHK from January 2006 to 2011. Patients' data with the history of electric burns were collected and analyzed by SPSS version 17.0 using descriptive analysis. Records having data missing in three or more variables were discarded.

**Results:** Out of total 371 patients, 336 (90.5%) were males while 35 (9.5%) were females. The mean age of electric burn injury patients was found to be  $27.35 \pm 12.38$ . The proportion of age-groups most affected by electric burn injury was between 21 and 30 years.

**Conclusion:** Electric burn injury predominantly involves young males aged 21-30 years. Our study has found an increasing frequency of patients sustaining severe injuries in the successive years. Since such devastating injuries stem from largely avoidable hazards, there is need for adoption of preventive strategies.

**Key words:** Electrical burn, burn centre, epidemiology, incidences.

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### INTRODUCTION

A burn is a type of injury to body tissues caused by heat, electricity, chemicals, light, radiation and friction.<sup>1-3</sup> Burn continues to be one of the major problems threatening public health in developing countries.<sup>4,5</sup> Burns injuries are among most disturbing of all injuries and a major global public health issue.<sup>6,7</sup> Electrical burn is a special type of thermal injury with a potentially devastating capacity for functional and aesthetic sequelae.<sup>8-10</sup> According to American Burns association repository report 2011, cases of electric burns constituted 4.09% of all burns cases presented to

American Burns Association.<sup>11</sup> It accounts for 4% to 6.5% of all admissions to burns units in the United States and for approximately 1000 fatalities per year.<sup>12</sup> Likely 130,000 emergency room visits are related to electrical injuries each year.<sup>13,14</sup>

Approximately 20% of all electrical injuries occur in children, with a bimodal peak incidence, highest in toddlers and adolescents. Most electrical injuries that occur in children are at home, with extension cords (60-70%) and wall outlets (10-15%) being by far the most common sources in this age group.<sup>15</sup>

Burns centre, CHK is one of the largest burn units of the country. Patients from all over Karachi are referred to this ward. The present study was designed to find out the workload and performance of the ward and to know the statistical significance of age group, gender, type of injury and mode of injury in the patients suffering from electrical burn injuries. Hence evolve evidence base to find out the population at risk in our setup and address the issue more efficiently.

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## PATIENTS AND METHODS

This retrospective study was undertaken at the Burns Centre, Civil Hospital, Karachi from January, 2006 to December, 2011. The research title and design of the study were approved by the Office of the Director Research DUHS. We performed a retrospective case note review of patients with electrical burns admitted to the Burns Centre, CHK over a 6-year study period between January, 2006 and December, 2011. Patients' files were obtained from the records room and were used to fill a questionnaire. The entries from the questionnaire were documented and digitalized into numeric data. The numeric data were analyzed by the SPSS software version 17.0. Patients from all age groups (infants, child, adult and old) of both genders having electrical burns were included. All data which had missing values in three or more variables were omitted and not analyzed. Only complete and valid data was used for analysis.

## RESULTS

Out of total 371 patients, 336 (90.5%) were males while 35 (9.5%) were females. Figure I shows the year wise admissions which showed an increasing trend of electric burn cases in successive years.

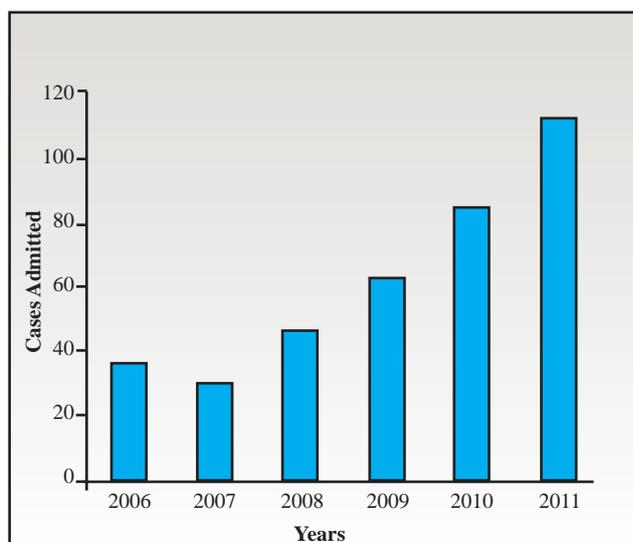


Figure I: Electric Burn Cases Admitted during January, 2006 to December, 2011 (n=371)

Patients ranged in age between 1 to 70 years. The mean age was  $27.35 \pm 12.38$  years.

Regarding most frequent age groups involved, the age-groups most affected was 21-30 years followed by the teenage age group 11-20 years. The populations with age below 10 years and above 50 years were found to be least affected. The involvement of age groups in each year in Table I.

Table I: Age groups of electric burn patients (N=371)

Years	Age Groups						
	0-10	11-20	21-30	31-40	41-50	51-60	61-70
2006 (n=36)	0	5	23	3	3	2	0
2007 (n=30)	0	8	14	4	1	3	0
2008 (n=46)	2	13	14	9	7	1	0
2009 (n=63)	4	21	18	13	6	0	1
2010 (n=84)	5	29	24	16	7	1	2
2011 (n=112)	8	31	43	17	7	5	1
Total (n=371)	19	107	136	62	31	12	4
Total (%)	5.1%	29%	36.6%	16.7%	8.3%	3.2%	1.1%

Out of total 371 patients, 336 (90.5%) were males and 35 (9.5%) were females. The involvement of males sex was found to be significantly more than the females sex. Total male to female ratio observed was approximately 9:1. The gender involvement for each year is depicted in Table II.

Table II: Gender involved in electric burn injury (n=371)

Year	Number of Patients (N)		Percentage (%)
2006 (n = 36)	Male	35	(97.22)
	Female	1	(2.78)
2007 (n = 30)	Male	29	(96.67)
	Female	1	(3.33)
2008 (n = 46)	Male	43	(93.47)
	Female	3	(6.53)
2009 (n = 63)	Male	55	(87.3)
	Female	8	(12.7)
2010 (n = 84)	Male	73	(86.9)
	Female	11	(13.1)
2011 (n = 112)	Male	101	(90.17)
	Female	11	(9.82)
All Years (n = 371)	Male	336	(90.5)
	Female	35	(9.5)

The outcome of patients admitted to Burns Centre, Karachi with electric burn injury was evaluated by number of electric burn patients and their mode of disposal (whether LAMA, discharged or expired). In Figure II, mode of disposal from the ward is described from the valid estimates obtained. Missing and incomplete values of each year were discarded. As per analysis, it is also apparent that the working load of Burns Centre, Karachi has increased approximately

thrice from 36 cases in 2006 to 112 cases in 2011, showing increased incidence of electric burn injury cases. Moreover successful treatment outcome from Burns Centre, Karachi has also improved year by year.

Outcome of Electric Burn Patients from Year 2006 to 2011

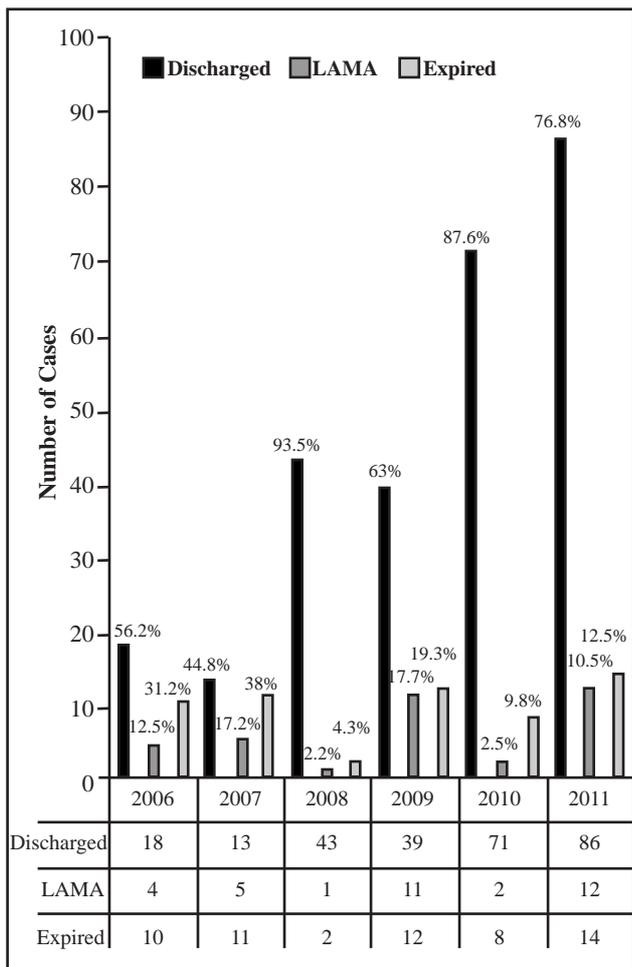


Figure II: Outcome of patients with electric burn injury for each year.

## DISCUSSION

Approximately 1000 deaths per year are due to electrical injuries in the United States, with a mortality rate of 3-5%.<sup>16</sup> Electrical injury may be the end result of contact with faulty electrical appliances or machinery or inadvertent contact with household wiring or electrical power lines. Electrical injuries can be characteristically divided into high-voltage and low-voltage injuries, using 500V or 1000V as the cutoff. High morbidity and mortality has been described in 600V direct current injury associated with railroad "third rail" contact.<sup>17</sup> In Pakistan, typical household electricity provides 200-240V for general use and high-powered appliances, while industrial, electrical and high-tension power lines can have more than 100,000V. In our study, we found that the most common age group involved was between 21 and 30 years followed by 11 and 20 years which is in conformity with the

study in India where most of the patients admitted at Jawaharlal Nehru Medical College and Hospital and Aligarh Muslim University were in 13-25 years age group, 21% patients were children while 79% were adults.<sup>18</sup> Also both researches in South India and Hong Kong showed that most of the affected burn individuals belonged to age group of 25-34 years and 15-34 years with male predominance respectively.<sup>19,20</sup> But a study in Taleghani Hospital of Iran found that Children less than 10 years of age and adults 10-20 years of age were identified to be at high risk of sustaining burns injuries.<sup>21</sup>

In Pakistan as it is in other parts of the world, electric burn injury is an infrequent accident but as it is shown by this study that electric burn injury is an ever increasing hazard in Karachi. Many of these hazards could be avoided by following manufacturer's safety instructions when using electrical appliances. By making sure that all electrical devices are properly designed, installed, and maintained helps prevent electrical injuries both at home and at work. Receiving an electric shock by touching an electrical outlet in the home or by a small appliance is hardly ever serious, but fortuitous exposure to high voltage current causes numerous deaths each year, which is why creation of Public awareness and education in this respect is especially important. So, prevention appears to be the most effective way in controlling the health problems related to the electric burn injuries so as to reduce the risk of accidental burn injuries. This could avoid high-voltage injuries as well which is getting frequent in the residents of Karachi.

Burn injuries in Pakistan are very common and these can happen to anyone and anywhere. In recent years, the incidence of electrical burns has increased in the people of Karachi so much that electric burns have become a noteworthy cause of death in Karachites. This could be attributed to the shortfall of electricity in the city and the slums of Karachi resorting to electricity theft from high-tension wires passing through poles in various areas. These High-voltage injuries come about from a conductive object touching an overhead high-voltage power line. In Pakistan, electric power is distributed and transmitted by bare copper conductors, which are insulated by air. If this air is infringed by a conductor, (e.g., an aluminum pole, antenna, iron hook etc), any person touching the conductor can be injured. Thus, the incidence could be tapered in the imminent years if the shortfall of electricity were to be made better in the city.

Therefore, these individuals should be especially considered regarding the incidences of electric burn injury and occasional morbidity and mortality can be

reduced by the creation of awareness, finding and eliminating the unsafe electrical sources (like hanging wires, broken poles) and careful treatment of affected individuals.

Job-related exposure to electricity is a very frequent incident for certain vocations. Ninety-seven percent of electricians in a survey indicated they had experienced an electrical shock; 2.5% reported losing consciousness due to an electrical shock.<sup>22</sup> People working in professions such as utility and construction workers are at larger risk than the common population.<sup>23</sup> Also, persons engaged in outdoor activities (e.g., campers, park rangers, military personnel) are at higher risk than the general population.<sup>24,25</sup> While a person who has been afflicted with a high-voltage electrical injury with severe burns is apt to seek immediate medical care, many sufferers of minor shocks may not. A survey of electricians, for example, found that medical care was generally sought only if there was a loss of consciousness, severe burn, or fracture.<sup>23</sup>

## CONCLUSIONS

Electric burn injury predominantly involves young males aged 21-30 years. Our study has found an increasing frequency of patients sustaining severe injuries in the successive years. Since such devastating injuries stem from largely avoidable hazards, there is need for adoption of preventive strategies

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