

A one year retrospective study of death due to electrocution

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Abstract

The study is done to review about the number of electrocution deaths that occurred in KMC and about safety measures to be taken to prevent mortality. One year retrospective study from January 2012 to December 2012 was done to study the pattern of electrical injuries, sex discrimination, age wise distribution, place of incident, source for causing electrocution and manner of death. **Aim:** To study the cases of death due to electrocution. **Objectives:** To study the pattern of injuries associated with cases of electrocution and to determine the causes and manner of death in fatal electrocution. The study consisted of 24 cases 20 male and 4 female their age ranged from 5-70 years .In that we have found all are due to accidental injury except one, which was suicidal in nature.


Keywords: Electrocution, point of entry, point of exit, electric burns, work place, house, accidental, suicidal.

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Received Date: 22/01/2016 Revised Date: 26/02/2016 Accepted Date: 15/03/2016

| Access this article online | |
|---|--|
| Quick Response Code: | Website: www.medpulse.in |
|  | DOI: 16 March 2016 |

INTRODUCTION

Electric shock is the sudden violent response to electric current flow through any part of a person's body whereas electrocution is the death caused by electric shock. Electrical injury is a relatively infrequent but potentially devastating form of multisystem injury with high morbidity and mortality. Immediate death may occur either from current-induced ventricular fibrillation or asystole or from respiratory arrest secondary to paralysis of the central respiratory control system or due to paralysis of the respiratory muscles. Presence of severe burns, myocardial necrosis, the level of central nervous system injury, and the secondary multiple system organ failure determine the subsequent morbidity and mortality. Electrical injuries can be categorized as high and low voltage injuries. The injuries result from direct effects of current, from conversion of electrical energy into thermal

energy as the current passes through the body tissues and from secondary effects. The severity of injury is determined by the voltage, current intensity, types of current, the current pathway, the duration of exposure, the resistance of the tissues, contact surface, the extent of the multisystem involvement and the circumstances surrounding the incident.¹ External marks of electric burning are seen in only 50 – 60% of the cases.² Melted metal beads could be found in the electrical current marks and the skin around them. The beads were composed mainly of common metals like iron, copper and aluminium.³ Wavy appearance of myocardial fibers and thin fragmentation may be suggestive of electrocution.⁴ Focal petechial hemorrhages, Irregular tears in the brain tissue and cortical separation has been described by Hassin in cases who have sustained high voltage electrocution.⁵ This is an attempt to study the pattern of injuries related to electrocution and to understand the cause and manner of death in such lethal cases.

METHODOLOGY

The present study was carried out at Government Kilpauk Medical College, Tamil Nadu from January 2012 to December 2012. A standard procedure was designed to ensure consistency for the samples. The format includes PM number and date, age, sex, occupation, place of incident, pattern of electrical injuries.

Study Design: Observational Study

Study Period: January 2012 to December 2012.

Place of Study: Government medical college, Kilpauk.

Sample Size: All cases of fatal electrocution reported to government medical college, Kilpauk were taken and statistically analysed.

Inclusion criteria: All cases reported as cases of alleged electrocution pertaining to this jurisdiction.

Exclusion criteria: Electrocution cases which doesn't come under this jurisdiction were not taken.

RESULTS

Table 1: Sex wise distribution

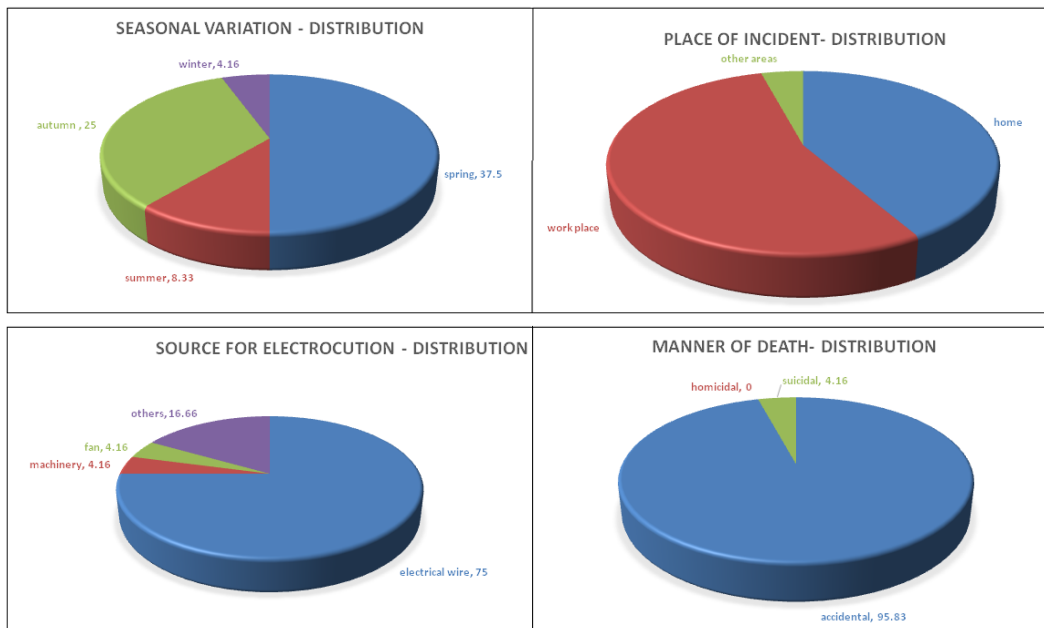
| Sex | No of cases | % |
|--------------|-------------|------------|
| Male | 19 | 79.16 |
| Female | 5 | 20.83 |
| Total | 24 | 100 |

Table 2: Age wise distribution

| Age | No of cases | % |
|--------------|-------------|------------|
| 1-10 yrs | 2 | 8.33 |
| 11-20yrs | 1 | 4.16 |
| 21-30yrs | 8 | 33.33 |
| 31-40yrs | 7 | 29.16 |
| 41-50yrs | 4 | 16.66 |
| 51-60yrs | 1 | 4.16 |
| 61-70yrs | 1 | 4.16 |
| Total | 24 | 100 |

Table 3: Pattern of electrical burns

| Wound | No of cases | % |
|---------------------|-------------|-------|
| Entry | 8 | 33.33 |
| Exit | 2 | 8.33 |
| Both entry and exit | 4 | 16.66 |
| Not observed | 10 | 41.66 |



DISCUSSION

The commercial use of electricity as a source of power began in 1849, but the death from this origin was not reported until 1879. Post that, widespread utilization of electrical power has been linked with a steep increase of both fatal and non-fatal injuries.⁶ In India, death occurs mostly at voltage between 220-24- volts with alternative current⁷, however, death due to lower voltage was also been reported(8,9). As expected, male accounted for the greatest number of death(79.16%). The highest fatality was in the age group 21-30 years(33.33%), followed by 31-40 year group (29.16%); the addition of both age groups goes upto 15 cases, means (62.49%) people in the age group between 21-40 years are generally vulnerable. The reason can be attributed to the fact that the earning age for livelihood. At extreme ages, the fatality was quite rare. More number of deaths were noticed in spring

season (37.5%)(9cases) followed by summer season (33.33%)(8cases) and autumn (25%)(6 cases). The most probable reason for increase in death during summer may be attributed to excessive use of electrical appliances because of sweat and humidity. Regarding the location of electrical burns over the body , electrical burns were more commonly seen over the upper and lower limbs(30%)(3 cases), which shows that majority of the cases did happen while repairing or checking of electrical appliances by hands and legs resting over the floor which clearly indicates that in most of the cases point of entry were over the upper limbs and point of exit were over the lower limbs. In this study only one case of suicide(4.16%) and no case of homicide was reported. The review of literature confirms that the suicide or homicide electrocution is rare(10,11,12). In this study the majority of the fatalities are the result of accidentally being in

contact with electricity normally at domestic supply. Many electrocutions occur at workplace (13 cases) (54.16%). Analyzing the place of occurrence of incident it reveals that more number of mortality was noted in work place followed by residence (10 cases) (41.66%). Underestimation of the danger of live circuits in workplaces and carelessness at workplace incidents whereas, ignorance, frayed or broken flex of electrical cables, faulty domestic appliances and improper earthing accounts for many of the domestic accidents.¹¹ The level of electrical injury depends on amount of current flow, voltage, the area of the contact and duration of contact. An electrical burn triggers only if the temperature of the skin is hot enough for a sufficiently long period to produce damage.¹³ On the other hand, a temporary contact or fall against conductor results in break in the circuit; in the cases of high- tension supplies the victim is usually thrown violently. In our study we have not noted any case of electrocution who died because of sustaining injuries over the body due to fall. We have noted only entry wound in (8 cases)(33.33%), both point of entry and exit in (4 cases) (16.66%) and exit in (2 cases) (8.33%) and both point of entry and exit were not noticed in (10 cases) (41.66%). In most of the cases victims were in contact with water mostly due to increase in moisture content in hands. Unlike dry skin, wet skin does not offer resistance to the passage of electric current, resulting in no visible electric burn mark at the area of contact.

CONCLUSION

Although fatalities caused by electricity are preventable, still deaths due to electrocution are increasing day by day. As per this study, we had noted that majority of fatalities (95.83%) were accidental in nature. Moreover accidental deaths were more common in young age group(75%) and men were found to be more vulnerable. Regarding the place of incident, number of deaths were more (58.33%)in working places when compared to residence(41.66%) and other areas(4.16%). In 16.66% of deaths both entry and exit points were noted,in 33.33% deaths point of entry alone was noticed. In about 41.66% cases, both point of entry and exit were not noticed. From

the present study we conclude that most of them were work- related and preventable.

RECOMMENDATION

Employers and workers should be educated to avoid such accidents with proper safety measures. Following certain safety measures like :

- Not using electrical appliances near water.
- Not using devices that have loose plugs and cracked wires.
- Not attempting to fix electrical devices ourselves.

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Source of Support: None Declared
Conflict of Interest: None Declared