

PROFILE OF ELECTRICAL INJURIES IN FATAL CASES BROUGHT TO DR. S. N. MEDICAL COLLEGE, JODHPUR

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ABSTRACT

Background: Accidents and fatal deaths are inevitable due to negligence and non-application of proper guidelines. Thus electricity has become essential, inevitable, and invaluable but dangerous part of our lifestyle. **Aim:** To study the pattern of injuries in fatal electrocution cases i.e. number of cases with electric contact marks, cases with flash burns and study of internal organs. **Material & Methods:** All suspected electrocution cases were subjected to medico legal autopsy during the study period were taken into the consideration. Post mortem examination of each case was carried out and photographs of finding were taken and relevant viscera were also examined by histo pathological analysis. Micro photographs of the slides were taken from the pathology department of Dr.S .N . Medical College, Jodhpur. **Results:** Electrocution deaths were more common among males in working age group and during summer season. All deaths in present study were accidental in nature. High voltage electrocution presents with flash burns and contact mark where as low voltage electrocution present with contact mark only. **Conclusion:** Electrocution can be prevented by educating people about the equipments, precaution to be taken while working with electrical equipments, replacing old electrical installations with new one, use of protective measures like gloves and harness to avoid fatal electrocution.

Keywords: Electrocution, Electricity, Fatal burn, Voltage

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INTRODUCTION

Electricity gives a wide variety of well-known effects, such as lightning, static electricity, electromagnetic induction and electrical current. In addition, electricity permits the creation and reception of electromagnetic radiation such radio waves.¹ The uses of electricity put to the service of man have no limitations.

Power is the basic need for the economic development of the country. Availability of electricity has been the most powerful aspect of introducing economic development and social change throughout the world. The process of moderation, increase in productivity in industry and agriculture and the improvement in the standard of living of

the people basically depend up on the adequate supply of electrical energy.¹

The quantum of danger exists as much as quantum of electricity is in use. Accidents and fatal deaths are inevitable due to negligence and non-application of proper guidelines. Thus electricity has become essential, inevitable, invaluable but dangerous part of our lifestyle.¹ The lowest recorded voltage at which death occurred from an electric shock is 38 volts.¹ It is possible to avoid electrical accidents in domestic, commercial and in industries, by following the strictly instructions, adopting electrical devices and also with proper application of electrical safety rules.² In cases of sudden death due to electrical shocks, the authorities will depend mostly or completely on medical evidence in establishing the cause of death. The doctors are the chief source of evidences upon which legal decisions are made. The main objective is to determine the truth, cause and the manner of death in case of electrocution and whether the death was due to negligence or accident or due to faulty electrical appliances.³

The precise total number of electrical accidents is difficult to ascertain, as number of non-fatal accidents are not recorded. The present study is limited to fatal cases of electrocution. The characteristic of electrocution being electric contact mark over the body is absent in many of the cases, which leads to the quest for diagnostic criteria of electrocution.³ It is often difficult to prove whether a man has been electrocuted, since death from electrocution can occur with no marks on the body, hence it is

important for forensic pathologist to be aware of lethal effects of electricity to aid in investigation of such cases.

MATERIAL & METHODS

All fatal electrocution cases undergoing medical autopsy in the department of Forensic Medicine Dr. S .N. Medical college, Jodhpur were studied prospectively during the period of 3.5 years from July 2011 to December 2014 after taking permission from ethical committee of S.P. Medical College, Bikaner.

Inclusion Criteria

Cases of Alleged history of electrocution death undergoing medico legal autopsy at place of study during said study period .

Exclusion criteria

1.Cases where data was incomplete. 2. Cases of lightning strikes, flame burn due to other than electrocution, scald burn and blast death .

All suspected electrocution cases were subjected to the medico legal autopsy and photographs of finding were taken and relevant viscera were preserved for histopathological analysis and finding were compared. Micro photographs were also taken from pathology department of Dr.S .N . Medical College, Jodhpur to correlate the findings.

RESULTS & DISCUSSION

In the present study, we observed that the most affected age group was 21 to 30 years, which have 44 cases (44%) out of 100 cases. In these 44 cases, 42 cases were males and 2 case were females, which shows that the majority of the victims were

male belonging to the working class. Nearly Similar result shown in the study of Chandru.⁴ The maximum electrocution death occurred in summer season which was 40% then rainy (38%) and winter (22%) seasons, which suggests that the wet surface plays a major role in electrocution. Almost similar results were also observed by Wrightand and Devis⁵ in their study. The observations of our study are different from the study done by Chandru⁴ and Pathak et al⁶ who found maximum deaths in in rainy season.

In our study, the leading cause of death in electrocution injuries was shock, which was constituting 70% cases, while it was 56% in the study of Chandu⁴ and 88.9% in Northeast delhi.⁷ After that septicemia was found in 11%, coma in 11% and shock with head injury in 8% cases as cause of death. The pattern of injuries in electrocution was also analyzed and we found that contact mark was observed in 30% cases, flash burn in 3%, contact mark with flash burn in 19%. No contact mark or flash burn was found in 7% cases and contact mark / flash burn & injury was foud in combination in 41% case. Our observations are in support of the observations of Chandu,⁴ who have have noticed contact mark in 44% cases, flash burn in 37% cases and a combination of contact mark and flash burn in 11% cases.

The main cause of electrocution was human negligence, which was seen in 59% cases followed by the lack of protective measures in 31% cases and faulty equipment & connection were found as culprit in 10% cases, which is almost similar with the observations of Chandru.⁴ In the present study, 46% deaths were due to high voltage electrocution and 54%

deaths were due to low voltage electrocution. Against this study Chandru⁴ found 54% deaths due to high voltage and 46% deaths due to low voltage electrocution. Employees of electric department constituted the major portion and six people of them died while working with electric transformer, laying electric wire and repairing over electric pole. Employees of electrical work were negligent because they were not using the protective measures while working, which were provided them in the form of protective gloves, harness, belts, etc. Domestic accidents, which consists 31% of total electrocution deaths were due to the faulty electrical equipments or connections and human negligence. One fourth of domestic accidents occurred in bathrooms involving boiler switches and immersion coils. Another important cause observed was contact with live wire while drying of wet cloths over metal wire (one fourth of total domestic cases) in correlation with Theodore Bernstein study.⁹ Houses constructed illegally with close vicinity to high-tension wire lead to electrical hazard with the dwellers. Short circuit with television cable wire has lead to electrical accidents to people who tried to connect the cable wire.

Table-1: Electrocution Deaths Based on Age & Sex

AGE IN YEARS	MALE	FEMALE
1 TO 10	2	0
11 TO 20	14	4
21 TO 30	42	2
31 TO 40	10	1
41 TO 50	11	2
51 TO 60	11	1
61 TO 70	0	0
m71 TO 80	0	0

Table-2: Seasonal Variation in Electrocution Deaths

SEASON	NO OF CASES	PERCENTAGE
Summer	40	40%
Rainy	38	38%
Winter	22	22%
TOTAL	100	100%

Table 3: Distribution of Cause of Death in Fatal Electrocution Cases

CAUSE OF DEATH	NO OF CASES	PERCENTAGE
Shock	70	70%
Septicemia	11	11%
Coma	11	11%
Shock & Head Injury	8	8%
TOTAL	100	100%

Table 4: Distribution Pattern of Injuries in Electrocution Death

INJURIES	NO OF CASES	PERCENTAGE
Contact Mark	30	30%
Flash Burns	3	3%
Contact Mark With Flash Burns	19	19%
No Contact Mark/ Flash Burns	7	7%
Contact Mark/Flash Burn&Injury	41	41%

Table 5: Distribution table indicating cause of electrocution

CAUSE OF ELECTROCUTION	NO OF CASES	PERCENTAGE
Human Negligence	59	59%
Faulty Equipments & Connections	10	10%
Lack of Protective Measures	31	31%
TOTAL	100	100%

Table 6: Distribution of Electrocution Deaths Based on Voltage

VOLTAGE	NO OF CASES	PERCENTAGE
High Voltage	46	46%
Low Voltage	54	54%
TOTAL	100	100%

CONCLUSION

Electrocution can be prevented by educating people about the equipments, precaution to be taken while working with electrical equipments, replacing old electrical installations with new one, use of protective measures like gloves and harness to avoid fatal electrocution. Electrocution is occupation related death as work place is common place of occurrence. The morbidity and mortality can be reduced by educating the people and the use of protective measures must be made compulsory to the workers especially employees of electric department.

Conflicts of Interest : None.

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