

A RETROSPECTIVE STUDY OF EPIDEMIOLOGICAL STUDY OF FATAL ELECTROCUTION CASES IN A TERTIARY CARE HOSPITAL

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Abstract

Introduction: Electricity is essential in life that without it life is hard to conceive. But the benefits and convenience of electricity are often correlated with the dangers. Electricity can often result in morbidity or mortality, both of which are via accident. Electricity has also been used for suicide reasons in extreme situations and homicidal purposes. Deaths attributed to electrocution around the world display a distinct trend.

Materials and Methods: Medico legal autopsies carried out on requisition from police or magistrate with primary aim to reveal the cause of death (COD) and to decide if COD is in accordance with the postulated manner of death. Sources of information included autopsy registers of department, personal data from inquest forms, histopathology reports and autopsy findings from post-mortem reports. In order to understand this type of fatalities, deaths due to or related to electrocution were carefully analysed regarding several variables, such as social-demographic ones, circumstances of death, available information and results of medico-legal autopsies. Data collected from tertiary medico legal centres in mid costal region of Andhra Pradesh.

Results: One hundred and ninety (190) cases received by the mortuary were deaths due to electrocution. Among them 165 cases were males and 25 cases were females. Majority of victims (55%) were aged 21 to 40 years. 63% of cases of electrocution occurred during daytime. Household fatalities are more accounting for 53%. Majority of cases were due to accidental manner except for 6 cases of suicide. Signs of electric current flow, cause of death and presence of electrical entry/exit wounds also ascertained.

Conclusion: In 5.3% of cases there were no entry or exit wounds, in all such cases, history regarding the incidence with detailed examination of scene of crime and autopsy report may conclude the cause of death and its manner. The current results point out the importance of a more extensive research concerning the signs of electric current flow through the body like focal diaphragmatic haemorrhages, petechial haemorrhages, congestion and oedema which help in concluding cause of death in absence of entry or exit wounds.

Key Words: Electricity, morbidity, mortality, autopsies, haemorrhages.

INTRODUCTION

Electricity is essential in life that without it life is hard to conceive. But the benefits and convenience of electricity are often correlated with the dangers. Electricity can often result in morbidity or mortality, both of which are via accident. Electricity has also been used for suicide reasons in extreme situations and homicidal purposes. Deaths attributed to electrocution around the world display a distinct trend.¹

Accidental fatalities from electrocution are not prominent in the west because of strong protection and high awareness many suicide reports have been registered, however. Accidental deaths from electrocution are more frequent than suicide deaths, despite this in developed countries like India. The typical domestic supply of AC current in India ranges from 220-250 volts, compared to 110 volts in western countries and for industrial use in India its 440 volts.²

There is as much risk as electricity is used. It is a threat. Accidents and injuries due to incompetence and inability to enforce effective protocols are unavoidable. Electricity has now become an integral aspect of our way of life, unavoidable, invaluable yet harmful. The lowest recorded electrical shock death voltage is 38 volts.⁴

In residential, commercial, and industrial settings, electrical injuries can be prevented by following specific guidelines, incorporating electrical appliances and even by enforcing electrical protection regulations properly. If electrical shocks trigger accidental death, the police can focus most or entirely on medical reports to decide causes of death. Doctors are the key source of proof for the decision-making process.⁵ The key purpose is to ascertain the facts, the cause, and the manner of death in the event of an electrocution, and to decide whether death was due to negligence or accident.

MATERIALS AND METHODS

Medico legal autopsies carried out on requisition from police or magistrate with primary aim to reveal the cause of death (COD) and to decide if COD is in accordance with the postulated manner of death.

Study Design- A Retrospective analytical Study.

Study Setting- Department of Forensic Medicine, at a tertiary care medico legal centre.

Period of Study- January 2022 to December 2023.

Sample Size- All cases of Electrocution death autopsies during the study period i.e. one hundred and ninety (190) cases.

Inclusion Criteria

Cases that are autopsied with death due to electrocution at a tertiary care medico legal centre.

Exclusion Criteria

Deaths due to lightening and hospital admission deaths of electrical burns were excluded from this study.

Sources of information included autopsy registers of department, personal data from inquest forms, histopathology reports and autopsy findings from post-mortem reports. In order to understand this type of fatalities, deaths due to or related to electrocution were carefully analysed regarding several variables, such as social-demographic ones, circumstances of death, available information and results of medico-legal autopsies.

RESULTS

One hundred and ninety (190) cases received by the mortuary were deaths due to electrocution. Among them 165 cases were males and 25 cases were females. Majority of victims (55%) were aged 21 to 40 years. 63% of cases of electrocution occurred during daytime. Household fatalities are more accounting for 53%. Majority of cases were due to accidental manner except for 6 cases of suicide. Signs of electric current flow, cause of death and presence of electrical entry/exit wounds also ascertained.

| S.No | Gender | Percentage (%) |
|------|--------|----------------|
| 1 | Male | 87% |
| 2 | Female | 13% |

Table 1: Gender distribution

| S.No | Age group | Percentage (%) |
|------|-----------|----------------|
| 1 | 1-10 | 3 |
| 2 | 11-20 | 40 |
| 3 | 21-30 | 61 |
| 4 | 31-40 | 44 |
| 5 | 41-50 | 26 |
| 6 | 51-60 | 13 |
| 7 | >60 | 3 |

Table 2: Age wise distribution

| S.No | Season | Percentage (%) |
|------|---------|----------------|
| 1 | Summer | 35% |
| 2 | Monsoon | 42% |
| 3 | Winter | 23% |

Table 3: Season Wise Distribution of Cases

| S.No | Time | Percentage (%) |
|------|-------|----------------|
| 1 | Day | 63 |
| 2 | Night | 37 |

Table 4: Time Wise Distribution of Cases

| S.No | Place of occurrence | Percentage (%) |
|------|---------------------|----------------|
| 1 | Work place | 35% |
| 2 | Unknown | 2% |
| 3 | Others | 10% |

Table 5: Place Wise Distribution of Cases

| S.No | Manner of death | Percentage (%) |
|------|-----------------|----------------|
| 1 | Accidental | 98% |
| 2 | Suicidal | 2% |
| 3 | Homicidal | 0 |

Table 6: Cases Depending on Manner of Death

| Cause of death | % | No, of cases |
|---|----|--------------|
| Direct electrocution | 89 | 169 |
| Electrocution associated blunt force trauma | 4 | 7 |
| Electrocution associated burns | 7 | 14 |

Table 7: Distribution of Cases Based on Associated Fatalities

| Signs of Electric Current Flow | % | No, of cases |
|----------------------------------|----|--------------|
| Focal diaphragmatic haemorrhages | 26 | 49 |
| Petechial haemorrhages | 78 | 148 |
| Congestion | 82 | 156 |
| Oedema | 63 | 120 |

Table 8: Presentation of Cases Based on Signs of Electric Current Flow through the Body

DISCUSSION

During the 2-year study period, 190 cases were deaths due to electrocution. There was, however, a progressive rise in rate of autopsies from 2023 to 2024. Electrocution cases accounted for 1.69% of total autopsies which is little less than observations by Gupta et al.4 (2.02%) and Rautji et al 5 (1.98%).

Overall, the findings of this study are in accordance with other similar studies. Majority of the victims are males accounting for 87% (n=165 cases) and females representing 13% (n=25 cases).

As evident from table 2, 21-30 years age group are more prone for electrical fatalities amounting for 32% (n=122) followed by 31-40, 11-20, 41-50, 51-60 contributing 23%, 21%, 14% and 7% respectively. There were 5 cases below the age of 10 years and 6 cases above age of 60 years. These statistics suggest that people were taking up electricity as profession in particular and employment at an early age generally coupled with the over enthusiasm of youth had amounted for this increase in the incidence of deaths due to this particular form of energy. Age group outcome is consistent with Indian studies and also with other country studies.

Seasonal variation in electrical fatalities also observed with 42% (n=80) in monsoon followed by summer, 35% and winter 23%. Seasonal variation in the number of deaths due to electrocution enables us to figure out that more number of cases were reported during the Summer and Monsoon season owing to the increase in use of electricity and electrical appliances in Summer and wet and conducive conditions that prevail in the Rainy season, that conclusively proves that Summer and Rainy season encounter more electricity related accidents.

Household fatalities dominated with 53% followed by work place with 35%. Previously work place fatalities are more than household fatalities but now curve shifted otherwise because of increase in electrical and electronic consumer durables usage.

CONCLUSION

Total one hundred and ninety (190) cases received by the mortuary were deaths due to electrocution. Among them 165 cases were males and 25 cases were females. Majority of victims (55%) were aged 21 to 40 years. 63% of cases of electrocution occurred during daytime. Household fatalities are more accounting for 53%. Majority of cases were due to accidental manner.

In 5.3% of cases there were no entry or exit wounds, in all such cases, history regarding the incidence with detailed examination of scene of crime and autopsy report may conclude the cause of death and its manner.

The current results point out the importance of a more extensive research concerning the signs of electric current flow through the body like focal diaphragmatic haemorrhages, petechial haemorrhages, congestion and oedema which help in concluding cause of death in absence of entry or exit wounds.

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