

Human fatalities due to outdoor electrocution with animal traps

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Abstract

Introduction:

Trapping animals with live electric wires is a practice known to be used for protecting the crops from wild animals. Unauthorized cables which are connected to the distributing system of the electricity board are laid on agricultural lands to trap animals such as wild pigs and wild boars. The serious issue is associated with this practice is the accidental entrapment of humans to these traps resulting in injury and death.

Methodology:

This descriptive study analyzed the socio-demographic profile of the victims, injury patterns, determined the manner of death and the judgments given by the judiciary.

Results:

The study includes 14 deaths recovered from the agricultural fields with electrocution injuries on which the medico-legal autopsies were conducted by the researchers in two hospitals of the southern province.

All the victims were males and the majority was in the 40-60 years. Electric entry marks were present in all on various parts of body. Injury varied due to different mechanisms like trapping, wrapping and griped with the cables. Majority of victims did not have any relationship with culprits. The live wire has been removed from the scene in 10 cases and the bodies were decomposed in 5 cases.

Police identified culprits in 9 cases and those were filed in the Magistrate courts and the accused were bailed out. None of the cases directed to high courts. The manner of death was concluded as an accidental.



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Conclusion:

It is important to implement the rules and regulations against the illegal practice of trapping of animals using high voltage electrocution.

Key words: Accidental Electrocution Outdoors, Animal traps, Hunting Practices

Introduction:

Electricity is an integral part of mankind and electrical burns are responsible for considerable morbidity and mortality. They are usually preventable.^{1, 2}When caused by contact with low-or medium voltage electric current, the electric entry mark or Joule burn is an important feature of electrocution.^{3,4}and It is a thermal burn, characterized by a collapsed crater with grey or white ring or an elongated linear groove with elevated margins.⁴The histology findings of electrocution injuries include separation of epidermis with microblisters, palisading of nuclei within squamous epithelium. There can be an exit mark which is usually observed on the soles of feet.

Almost all the electric fatalities by electrocution are accidental while homicides and suicides are rare or uncommon.^{5,6}The common accidental circumstances are home accidents and outside home accidents includework related accidents. A5 year review of different facets of electrocution in India revealed 14.9% of total 5431 death were due to contact with non-insulated wires in public places or in non-insulated wires in farms for keeping the animals away.⁷

Trapping animals using electric traps is a known practice used for hunting for food and protecting the crops from wild animals in Sri Lanka. Live non-insulated electric cables, one end of which is connected to the distributing power line are laid across the known trails of animals. As obtaining electricity from the power lines is illegal the people who practice this remove the cables by morning. The worst scenario is entrapment of humans to these animal traps. The deaths following contact with animal traps are observed in several geographical areas of Sri Lanka. This practice has been noted form in several rural areas of Galle and Matara districts of the Southern province.

To our knowledge no study has been done and no statistics are available on deaths due to outdoor electrocution by animal traps in this country. Recovering of death bodies in outdoor trapping is usually late. Removal of evidences from the original scene has further delays recovery. Alteration of the scenes and removing evidences causes greater difficulties to the investigators.

This study was planned to highlight the magnitude of the problem of electrocution deaths following contact with animal traps and also to unravel different medico legal aspects of these deaths.

Methods

This descriptive retrospective study was carried out on electrocution deaths following contact with animal traps brought to the Base Hospital Elpitiya and District General hospital Matara. The data was obtained from the investigating police officers, the next of kin and the post mortem reports. During the period from August 2018 to October 2019 fourteen (14) medico legal autopsies were performed on deaths due to electrocution with animal traps. A complete medico legal autopsy including histology examination of the suspicious electric injury was obtained. Sociodemographic data, scene visit findings, and autopsy features recorded in the post mortem reports, histology findings and the photographs taken at the crime scene and the autopsy were collected and analyzed. The crime scene visit was done with the investigating police officers.

Scene examinations was used to observe the uniform mechanism of laying the cables around the field of hunting and understand different other circumstances. According to the scene visit findings un insulated cables were laid around 10- 12 cm from the ground. The height from the ground was varying with uneven ground levels. The wooden sticks were erected on the ground to fix the cable above the ground. One end of the cable was fixed to the distributing electric cables with a hook(pahankoku).

Results:

All the dead bodies were recovered from non-cultivated agricultural lands after been missing for a period of time. The investigations were carried out by seven police stations, Pitigala (2), Uragaha (2), Kosgoda (1), Karadeniya (2), Akuressa (3), Gandara (1), Kamburupitiya(1) and Dickwella (1) in Galle and Matara districts. All 14 victims were males. The youngest victim was 17 years and the eldest was 75 years and the majority(6) was in 50 – 75 years category. Majority was casual laborers and farmers and 2 were unemployed. When the relationship of the victim with the trappers was concerned 2 were victims of their own traps, the 1 culprit was trapped in other's trap and 6 were known to the trapper and some were helpers of the trappers named as friends in the study. Five victims had no relationship with the trapper and addressed as outsiders in the study. (Table 1) Six trappers were identified by the police following the investigations.

When the scene visit was done, in 2 cases the scene was not disturbed and the live cable was at the scene and the victims were the trappers themselves. (Fig. 1) Only part of the cable was present in 3 cases and the cables were missing in 6 cases. Two bodies have been removed from original place of death to another place. Removing the evidences (circuits and appliances) or dead bodies from the scene was seen in eleven cases. In one incident three dead bodies trapped to a single circuit, one person was the trapper and the other two were helpers.

A meticulous autopsy examination was performed by the researchers. The size, shape, anatomical location and specific features of the Injuries were documented. Table 2. The sections of the skin from the suspected electric injuries were taken for histopathology. Electric entry marks were observed on the skin on 13 victims. An elongated burn mark was observed transversely placed on the front aspect of the trouser at the level of thighs and examination of underlying skin of thigh revealed elongated area with loss of soft tissues with black edges. Typical electrocution burn injuries were seen in all (6) fresh bodies. (Fig.2) Typical electric entry mark includes a groove with elevated margins with surrounding burning. Shallow grooving of the dermis where the epidermis loosened, was seen in all 2 cases of an advanced state of decomposition. (Fig.3)

In all cases, the samples from the contact skin of the electrical injury were preserved for histology examination. The sections show separation of the epithelium, with burning and charring of epithelial cells and in one section of a severely decomposed body showed palisading appearance. On decomposed bodies where the epidermis has been peeled off due to post mortem changes still the grooved appearance with elevated margins were readily seen.

A single electric entry injury was present in 5 cases and on the rest, there were numerous electric entry marks were found. When the anatomical areas were considered the electric entry, mark was present on lower limbs in 9 cases, on hands in 4 cases and on the chest in 1 case. The exit mark was not seen in any of the cases. Table 2.

Total 8 bodies were in a state of decomposition and the estimated time since death was more than 24 hrs. table 3.

There were no other perimortem injuries on the body and there was no evidence of natural diseases in any of the cases. The toxicological analysis was not considered in this study as several bodies were decomposed and the results would have been difficult to be interpreted.

The cause of death in all cases was concluded as electrocution and the manner of death was determined as accidental. The trappers in all 6 cases were identified and were produced in the Magistrate courts and were bailed out.

Discussion:

All the victims in this study were discovered from the outdoor scenes after been missing for a period. The electric mark was present on 13 victims and it is considered as a hallmark of diagnosis of electrocution is forensic practice.⁸The electric entry mark or Joule burn due to contact with the domestic electric current has classical features macroscopically as well as microscopically. It is characterized by a crater with elevated margins. The mark may reproduce the shape of the conductor when there is a linear wire creating an elongated groove with elevated margins⁹ which was observed in all victims in the study. The important finding in this study was the electric entry mark was able to observe even in moderate to severe decomposed bodies.

The microscopical findings of electric mark includes thermal denaturation of collagen causing it to stain blue with haemotoxillin, separation of microblisters within squamous epithelium, stretching and narrowing of the contours of the nuclei of epithelial cells resulting in palisading type of appearance⁷ and burning and charring of the skin. In our study the sections showed burning and charring of epithelium, separation of squamous epithelium and palisadingtype appearance. The appearance of the grooving and elevation of the margins were also observed. Even in severely decomposed bodies several histological features of electrocution were present which implies the importance of the histology in electrocution deaths.

Injuries around the knees and legs were compatible with the primary contact while crossing the live current cables. Injuries in the fingers and the finger webs were of injuries of gripping the cables. In two cases It was evident the cable was held in the clenched hands. This is a salient feature of an instant death described as cadaveric spasm which is an instantaneous rigor without preceding post mortem flaccidity. The precise pathophysiological basis of this phenomenon is still unknown.¹⁰

According to the available literature the accidental electric injuries are usually present on the hands.^{5,7,11}But in our study the majority had the injury on the lower limbs. The crime scene examinations were useful in observing the mechanism of laying the cables around the field of hunting and to interpret the injury pattern observed on victims. In one crime scene examination the victim who was the trapper had accidentally trespassed someone else`s trap and sustained electrocution. There was a roll of cables and a bundle of sticks near the body. (Fig.1)Live cables were not at the scene in six cases which means the person responsible for the laying cables or other person intervenes and removed from the scene. Several bodies have been moved from the original place of death. It underscores the need to visit the crime scene to understand and interpret different medico legal issues in forensic practice.

The exit electric mark or electrical grounding mark was not observed in all cases. The wet feet due to walking on the wet ground may have lowered the skin resistance and density of electric current, hence no exit mark would be expected⁵.

The cause of death was ascertained as electrocution after considering the findings of the crime scene investigations, presence of macro and microscopical features of electrocution, absence of other injuries or pathology at the autopsy.

The manner of death in all cases was concluded as accidental which could be debatable. The culprits have stolen the electric current from the distributing power lines, laid on accessible areas and resulting in human fatalities. At present there is no provision in the law of the country to take serious actions against this offence. We believe that it is a lapse that needs immediate attention which could deter people from engaging in this dangerous practice.

This study confirms the importance of close attention and meticulous autopsy examinations at the crime scene examination not only to document the cause of death but also to detect other associated conditions, all of which should help prevent such future deaths.

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Fig 1.



Fig 2.



Fig 3.



TABLE 1. demographic Information of victims of electrocution

Characteristic	Number	Percent
Gender		
Male	14	100%
Female	0	0%
Age Group		
Below 20 years	1	7.1%
20 – 40 years	6	42.8%
40 -60 years	5	35.7%
Above 60 years	2	14.2%
Occupation		
Unemployed	2	14.2%
Casual Laborer	5	35.7%
Famers	7	49.9%
Relationship to the culprit (as per police investigation findings)		
Real culprits	3	21.3%
Friends of culprits	6	42.8%
Outsiders	5	35.5%

Table 2 – injury description

Character	Number	Percentage
Nature		
Skin burn with typical electrical Injury	8	57.1%
Skin burn	3	21.4%
Skin Burn with grooving of dermis	2	14.2%
Fabric burn	1	7.1%
Site		
upper extremity only	3	21.4%
lower extremity only	7	50%
upper and lower extremity	2	14.2%
other	2	14.2%
Anatomical position, height from heel		
Only for lower limb injuries (10)		
< 12 cm	1/10	
12 -15 cm	6/10	
> 15 cm	3/10	

Table 3 – postmortem status and other medico-legal observations

Character	Number	Percentage
Time of recovery from death		
< 6 hours	5	35.5%
6 - 12 hours	2	14.2%
12 -24 hours	5	35.5%
>24 hours	2	14.2%
State of death at autopsy		
Fresh	6	42.6%
Moderate decomposition	6	42.6%
Advance decomposition	2	14.2%