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Toxicological SciencesJournal homepage: <http://www.ijfmts.com/>**Review Article****High voltage electrical injury- Knowledge and need of the hour****Mohd Kaleem Khan¹, Kashif Ali^{1,*}**¹Dept. of Forensic Medicine, Jawaharlal Nehru Medical College, AMU, Aligarh, Uttar Pradesh, India**ARTICLE INFO***Article history:*

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ABSTRACT

Electrical burns are linked to a high rate of morbidity and mortality, and are usually avoidable with basic safety precautions. High voltage electrical injuries are uncommon, yet they have a high death rate. Electrocution refers to any death caused by an electrical shock to the body. Although the introduction of electricity was hailed as a gift to civilization, its use in domestic households has continued to increase fatalities, either because of lack of public awareness, total negligence on the part of the general people and electrical distribution agencies. Electricity's ever-increasing reliance on industry and domestic demands exposes man to injury from electric current and equipment that runs on it.

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Electrical injuries are a complicated type of trauma with a high rate of morbidity and fatality. The type of current, voltage and resistance all affect the severity of the injury. Electrical injuries, which occur as a result of lightning, low-voltage, or high-voltage injury, are generally associated with high morbidity and death. Almost all electrical injuries are unintentional and, in many cases, avoidable. They have a high death rate, as well as serious systemic consequences in those who survive. Carelessness or ignorance is one of the key reasons for the majority of electrical fatalities in accidental electrocution.¹

In 1879, a carpenter in Lyons, France, was killed by electric current from an artificial source when he accidentally came into contact with a 250 volt AC generator which is the first recorded death caused by electric current.² The conversion of electric energy into heat while passing through tissue causes electrical damage. Although electrocution is not common, it is typically lethal. It can leave survivors with catastrophic injuries and perhaps

lasting impairments. Low voltage (less than 600 V), high voltage (more than 600 V) and lightning all cause electric injury.³

Low-voltage power is commonly used in the home, but high-voltage power is typically used in industries. High-voltage electrical transmission is also utilized to transport power from grid to grid and in between substations. The majority of high-voltage power is delivered via non-insulated wires. Most of the time, inadequate wire maintenance and unfavorable weather conditions cause these wires to break and cause electricity induced burns and injuries. An electrical injury, such as a shock from a small appliance, extension cord, or wall outlet, can occur at home and is extremely seldom associated with serious trauma but domestic supply due to high current value cause serious damage to heart myocardium which very often lead to death due to ventricular fibrillation. Myocardial cell membranes are very sensitive to current (30 mA to 80 mA), when heart in axis of current path, current causes serious damage to myocardium and cause instantaneous death even if the current persists for few seconds.⁴ Biting or chewing on an electrical cord can cause low-voltage

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damage without causing loss of consciousness or arrest in children. Adults who work on home or workplace equipment or circuits may sustain similar accidents. Low-voltage electrical current, like high-voltage current, can cause significant harm depending on the length of exposure, the individual's size and the cross-sectional area in contact with the electrical source.^{5–7}

Suicide by electricity is rare phenomenon, though reported many a times.⁸ Injury through high voltage supply wires often broke on people working in farming sector, passersby and electricity workers. These injuries are often very morbid and less lethal. This morbidity often leads to physical inability to work which lead to loss of work and permanent disfiguration which is also very catastrophic. Awareness among general population is very much need of the hour and also the accountability of the electricity supply agencies. Proper compensation and rehabilitation programs should be there and that too easily accessible. Very few cases reach to the courts due to lack of awareness among people.

2. Judgements Regarding Compensation

1. The respondents were directed to pay a sum of Rs.7 lakhs as compensation for the death of the petitioner's wife by Madras High Court.⁹The petitioner's wife was stated to be a domestic helper who also worked as a sweeper in numerous houses in the neighborhood. On 21st January 2015 at approximately 11.30 a.m., she was returning after finishing work in a few houses; the day was windy, and rains had fallen the day before, resulting in water stagnation on the road. The petitioner's wife attempted to cross a stagnant pool of water on the road, not realizing that there was a live wire, a high tension wire that had snapped away from the electric pole and was in touch with the stagnant water. The petitioner's wife was electrocuted after coming into contact with the stagnated water.
2. The respondents were directed to pay a sum of Rs.5 lakhs to the petitioners by Madras High Court.¹⁰ Electrocution was the cause of death. The deceased was electrocuted when the steel rod he was carrying came into touch with a live High Tension wire. The petitioner's house was located near a high-tension wire.
3. The petitioner was held entitled to receive an amount of Rs. 12, 67,000 from the respondents by High Court of Meghalaya.¹¹ A 23 years old female along with her friend went to the terrace of the residential building located at Police Reserve Quarter, Shillong, to collect the dried clothes on 19th February 2012 at around 3.30 p.m., and both of them were electrocuted when they came into contact with the 11 KV electricity supply line passing dangerously close to the building.

3. Awareness and Prevention

1. During the design phase of building or maintenance projects, identify potential electrical hazards and relevant safety solutions.
2. Workers who work with or around exposed components of electric circuits should receive additional specific electrical safety training.
3. Create and implement a thorough safety programme, and adjust current programmes as needed.
4. Provide proper training to all employees in identifying and controlling the hazards related with electricity at the workplace.
5. When working outside, keep an eye out for electrical sources above and below the feet. Keep at least 10 feet distance away from overhead power wires even when using an extension ladder.
6. "I won't be harmed by low voltage." This is a prevalent misconception. Muscles can be paralyzed by currents more than 10 milli amperes 2.5 volts, making it difficult to release grips on tools, wires, or things in your hands.¹² If you can't let go, the current will continue to flow through your body and therefore prolonged contact can cause muscle constriction, particularly in the muscles that govern respiration.
7. Proper electrical safety awareness program should be conducted by state governments from time to time.

4. Conclusion

The legislation should be more hard line in terms of public safety, particularly when it comes to power and electrical appliances. Typically, such deaths are unintentional and can be avoided if sufficient safety precautions are used. When using malfunctioned equipment, non insulated wiring, or broken appliances, extreme caution should be exercised. People who live near high-tension wires or who climb on the roof of a railway bogie are especially vulnerable to electrocution. So this type of contact should be avoided. Poor infrastructure and maintenance by power supply companies should be held accountable, notably in terms of human life and disabilities among workers and civilians.

5. Conflicts of Interest

None.

6. Source of Funding

None.

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