Electric shock in patients administered to hospital: a descriptive study

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Brief Communication

Electric shock is one of the major causes of death in developing countries (1,2). It results from the direct contact of any source of electricity with the human body that causes sufficient current through the skin, muscle or hair. The expression is described as injurious exposure to electricity. This type of injury is mostly classified as the work related fatalities and injuries, whether legal or illegal works (3). To date, we are unaware of any study describing the demographic and characteristics of electrical shock victims referring to the hospitals of Iran. This information may lead to providing a better insight for the treatment and management of these patients and developing better preventive strategies for those at higher risk of electrical shocks.

We performed a descriptive study on 95 patients referring to the Hafte-Tir hospital, affiliated to Iran University of Medical Sciences, in Tehran with the complaint of electrical shock. The study was conducted from January 2011 to January 2013. The inclusion criterion was admission due to the history of electrical shock. The exclusion criteria were as follows: past history of other diseases such as cardiac, pulmonary and central nervous system diseases and drug or alcohol abuse. Demographic and anthropometric information of all participants including age, sex, route of exposure, entrance site and exit site were recorded for all the cases. A questionnaire studying the underlying factors for the accident as well Glasgow Coma Scale (GCS), outcome, type of electricity and admission duration was filled for all the cases. Illegal exposures to electricity including suicide, murder or during stealing from other places were also recorded. The patient’s guardian was asked for written informed consent before participation. The patients were also asked for inclusion in the study before participation. The study was approved by the local ethics committee of the hospital. All the procedures and steps of the study were performed according to the declaration of Helsinki.

The primary characteristics of the participants are presented in Table 1. The participants included 95 patients who were 26-45 years of age. Most of the accidents took place out of home and due to illegal exposure to electricity. The gap between the accident and hospital admission was between 30 minutes to 2 hours. The entrance place

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was the hand and the exit place was also the hand in most of the cases. The patients had a normal Glasgow Coma Scale (GCS) on admission (63/95), and they were mostly male (91/95). One of the patients who reached the hospital died during the admission.

Our findings revealed that young people are at a higher risk of electrical injury compared to other age population due to the illegal use of the electricity due to their need. In this study, it was also revealed that the death rate was nearly 1% among the admitted patients. In other words, the victims of electrical shock often die at the scene, but if the victims can arrive at the hospital alive, then the chances of survival will be high. This is the first report of electrical injury victims in Iran.

In 1993, there were 550 electrocutions in the US, which caused 2.1 deaths per million inhabitants (4). The incidence of electrocutions is decreasing (electrocutions in the workplace make up the majority of these fatalities), but new jobs provide more hazards for the workers (1, 2, 5-9). Large funds are provided to prevent fatality by electrocauion (10).

Table 1. Presenting the Characteristics of the Participants

| Age Groups | Frequency | Percent | Valid Percent | Cumulative Percent |
|------------|-----------|---------|---------------|--------------------|
| 6-20       | 11        | 11.6    | 12.0          | 12.0               |
| 21-25      | 18        | 18.9    | 19.6          | 31.5               |
| 26-35      | 26        | 27.4    | 28.3          | 59.8               |
| 36-45      | 25        | 26.3    | 27.2          | 87.0               |
| 46-55      | 6         | 6.3     | 6.5           | 93.5               |
| 56-100     | 6         | 6.3     | 6.5           | 100.0              |
| Hospital admission | 75 | 78.9 | 78.9 | 78.9 |
| Private | 20 | 21.1 | 21.1 | 100.0 |
| Place of accident | Home | 11 | 11.6 | 11.6 | 11.6 |
| Out of Home | 84 | 88.4 | 88.4 | 100.0 |
| The route of accident | Car crash | 31 | 32.6 | 32.6 | 32.6 |
| Legal | 29 | 30.5 | 30.5 | 63.2 |
| Illegal | 35 | 36.8 | 36.8 | 100.0 |
| Place of exposure | Home | 26 | 27.4 | 27.4 | 27.4 |
| Between cities | 24 | 25.3 | 25.3 | 52.6 |
| In cities | 45 | 47.4 | 47.4 | 100.0 |
| Season of the accident | Spring | 30 | 31.6 | 31.6 | 31.6 |
| Summer | 29 | 30.5 | 30.5 | 62.1 |
| Autumn | 13 | 13.7 | 13.7 | 75.8 |
| Winter | 23 | 24.2 | 24.2 | 100.0 |
| Time gap between accident and hospital admission | Less than 30 minutes | 7 | 7.4 | 7.4 | 7.4 |
| 30 minutes to 2 hours | 82 | 86.3 | 86.3 | 93.7 |
| More than 2 hours | 6 | 6.3 | 6.3 | 100.0 |
| Being Alive | Alive | 94 | 98.9 | 98.9 | 98.9 |
| Dead | 1 | 1.1 | 1.1 | 100.0 |
| Entrance Place | Head and Neck | 18 | 18.9 | 19.1 | 19.1 |
| Hand | 64 | 67.4 | 68.1 | 87.2 |
| Chest and abdomen | 9 | 9.5 | 9.6 | 96.8 |
| Legs | 3 | 3.2 | 3.2 | 100.0 |
| Exit Place | Hand | 30 | 31.6 | 47.6 | 47.6 |
| Chest and Abdomen | 14 | 14.7 | 22.2 | 69.8 |
| Legs | 19 | 20.0 | 30.2 | 100.0 |
| GCS (Glasgow Coma Scale) | 8> | 9 | 9.5 | 10.5 | 10.5 |
| 8-10 | 10 | 10.5 | 11.6 | 22.1 |
| 11-13 | 4 | 4.2 | 4.7 | 26.7 |
| 14-15 | 63 | 66.3 | 73.3 | 100.0 |
| Gender | male | 91 | 95.8 | 95.8 | 95.8 |
| female | 4 | 4.2 | 4.2 | 100.0 |
| Admission Duration | 0-7 | 33 | 34.7 | 34.7 | 34.7 |
| 8-14 | 26 | 27.4 | 27.4 | 62.1 |
| 15-21 | 13 | 13.7 | 13.7 | 75.8 |
| 22-30 | 11 | 11.6 | 11.6 | 87.4 |
| 31< | 12 | 12.6 | 12.6 | 100.0 |

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In this study, the most frequent cause of electrocution was stealing electricity which mostly happened in the spring and summer. Considering that this study was conducted in the southern region of Tehran, an active industrial area in which many young workers work, it is not surprising to find that electric shocks occur with a high rate in young people in warm seasons.

The principal limitation of the present study was its cross sectional nature, which precludes the determination of the direction of causality; however, we took advantage of the large sample size and the close similarity between the groups in most of the potentially confounding variables.

References
1. Ergor OA, Demiral Y, Piyal YB. A significant outcome of work life: occupational accidents in a developing country, Turkey. J Occup Health 2003;45 (1):74-80.
2. Zeng S, Powers JR, Newbraugh BH. Effectiveness of a worker-worn electric-field sensor to detect power-line proximity and electrical-contact. J Safety Res 2010;41 (3):229-39.
3. Byard RW, Hanson KA, Gilbert JD, James RA, Nadeau J, Blackbourne B, et al. Death due to electrocution in childhood and early adolescence. J Paediatr Child Health 2003;39 (1):46-8
4. Centers for Disease Control and Prevention (CDC). Work-related fatalities associated with tree care operations—United States, 1992-2007. MMWR Morb Mortal Wkly Rep 2009; 58 (15): 389-93
5. Janicak CA. Occupational fatalities due to electrocutions in the construction industry. J Safety Res 2008;39 (6):617-21.
6. Lipscomb HJ, Dement JM, Rodriquez-Acosta R. Deaths from external causes of injury among construction workers in North Carolina, 1988-1994. Appl Occup Environ Hyg 2000;15 (7):569-80.
7. McCann M. Deaths in construction related to personnel lifts, 1992-1999. J Safety Res 2003;34 (5): 507-14
8. Rodgers GB, Garland S. The impact of immersion protection requirements on hair dryer electrocutions in the USA. Inj Prev 2012;18 (6): 371-76.
9. Vergara XP, Kheifets L, Silva M, Bracken TD, Yost M. New electric-shock job exposure matrix. Am J Ind Med 2012;55 (3): 232-40.
10. Chaumont Menendez C, Castillo D, Rosenman K, Harrison R, Hendricks S. Evaluation of a nationally funded state-based programme to reduce fatal occupational injuries. Occup Environ Med 2012;69 (11):810-14.