

Electrical burns in Mexico

Rodrigo Edmundo Morales Perez M.D.
Victor Mario Martinez Bravo M.D.
Christopher Junnoel Dominguez Gutierrez M.D.
Martin Felipe Tognola Sanchez M.D.
Montserrat Cantellano Duran M.D.

Veracruz, Mexico

Mini Review

Emergency Medicine



Electrical burns are thermal injuries that result from exposure to electric currents. These burns can have a devastating impact on the health of affected individuals, causing damage to the skin, deep tissues, and internal organs. In Mexico, electrical burns represent a major public health problem due to their high incidence and the physical, psychological and economic consequences they entail.

Epidemiology in Mexico

During the period between January 1, 2009 and December 31, 2011, the National Epidemiological Surveillance System, belonging to the General Directorate of Epidemiology of the Ministry of Health of Mexico, registered a total of 262,305 people burned in the country. Of these figures, the Mexican Social Security Institute (IMSS) provided medical care to 171,827 individuals (equivalent to 65.5% of the total), the Ministry of Health treated 56,054 people (21.4%), the Institute of Security and Social Services of State Workers (ISSSTE) to 9,741 people (3.7%), PEMEX attended to 3,882 people (1.5%), and other institutions were responsible for the care of 19,101 individuals (7.3%).

The epidemiology of electrical burns in Mexico shows a worrying incidence of these cases in the population. It is estimated that thousands of people suffer electrical burns every year in the country. Groups at higher risk include construction workers, electricians, children and adolescents. In addition, electrical burns are more prevalent in urban areas and in regions with poor or poorly maintained electrical infrastructure.

The lack of adequate safety measures, lack of training in the handling of electrical equipment and

Background

Electrical burns are devastating injuries that can have serious consequences for patients' health. In Mexico, these burns represent a significant public health problem, with a high incidence and a considerable socioeconomic impact. In this literature review article, a synthesis of the updated scientific literature on electrical burns in Mexico is presented, addressing its epidemiology, clinical significance, definition, diagnosis, management, complications and a discussion on the relevant aspects of this problem. In addition, it concludes by highlighting the importance of prevention, early diagnosis and appropriate treatment to improve the prognosis and quality of life of patients affected by electrical burns in Mexico.

Keywords: Electrical burns, epidemiology of burns, management of burns.

lack of awareness about electrical hazards contribute to the high incidence of electrical burns in the country. In addition, unfavorable socioeconomic conditions, lack of access to timely medical care, and a shortage of specialized burn centers can also negatively affect patient management and prognosis.

Clinical significance

Electrical burns have a significant impact on the physical, emotional and economic health of patients. These injuries can lead to serious complications, such as wound infections, cardiovascular disorders, neurological damage, psychological disorders and functional disabilities. In addition, rehabilitation of patients with electrical burns may require a long-term, multidisciplinary approach, involving diverse health professionals and can be costly to both the health care system and patients and their families.

The clinical significance of electrical burns goes beyond physical complications. These injuries can also have a significant psychological impact on patients, including post-traumatic stress disorder, depression and anxiety. In addition, the aesthetic sequelae of electrical burns can affect patients' self-esteem and quality of life, underscoring the importance of a comprehensive approach in the management of these injuries.

This literature review article seeks to provide a global view of electrical burns in Mexico, addressing their epidemiology, clinical significance, definition, diagnosis, management and complications. The updated scientific literature will be analyzed to better understand this problem and highlight the needs for prevention, early diagnosis and adequate treatment in

From the Regional Hospital of High specialty ISSSTE Veracruz, Mexico. Received on July 17, 2023. Accepted on July 22, 2023. Published on July 23, 2023.

Institution	Number of People Burned	Percentage of Total (%)
Mexican Social Security Institute (IMSS)	171,827	65.5
Ministry of Health	56,054	21.4
Institute of Security and Social Services of State Workers (ISSSTE)	9,741	3.7
PEMEX	3,882	1.5
Other Institutions	19,101	7.3
Total	262,305	100

Table 1. Distribution of burned patients.

the Mexican context. Through this review, we hope to contribute to existing knowledge and promote more effective and patient-centered care for those affected by electrical burns in Mexico.

Definition

Electrical burns are defined as thermal injuries caused by exposure to electrical currents passing through the human body. These burns can result from different forms of contact with electricity, such as direct discharges from electrical sources, electric arcs or contact with electrical objects or equipment. The severity of electrical burns depends on the intensity of the current, the duration of exposure, and the strength of human tissue.

Electrical burns can be classified into direct electrical burns, which occur when electric current passes directly through the body, and indirect electrical burns, which occur when current passes through a conductive object before coming into contact with the body. In addition, electrical burns can affect both the skin and deeper tissues, such as muscles, nerves, and internal organs.

Diagnosis

The diagnosis of electrical burns is based on a thorough clinical evaluation and history of the electrical incident. During the physical examination, the extent and depth of the burns are evaluated, as well as the presence of associated lesions in other body systems, such as the cardiovascular system, nervous system, and respiratory system.

In addition to clinical examination, complementary tests may be used to assess the severity of electrical burns and detect possible complications. These tests may include blood tests to assess the patient's general condition, X-rays to detect possible bone fractures, and imaging studies, such as computed tomography (CT) or magnetic resonance imaging (MRI), to assess the extent of injuries and detect deep tissue damage.

Management

The management of electrical burns involves a multidisciplinary approach that requires the collaboration of several health professionals, such as doctors, plastic surgeons, nurses, rehabilitation specialists and psychologists. The main goal of management is to minimize complications and promote wound healing.

Treatment of electrical burns may include cleaning and debridement of wounds, application of specialized dressings, use of advanced healing therapies, administration of analgesics to control pain, and prevention and treatment of infections. In addition, physical and occupational rehabilitation plays a crucial role in patients' recovery, helping them restore function and adapt to potential disabilities resulting from electrical burns.

Complications

Electrical burns can lead to a variety of complications that can affect patients' prognosis and quality of life. These complications can include wound infections, cardiovascular disorders such as cardiac arrhythmias or heart muscle damage, neurological damage such as peripheral neuropathy or spinal cord injuries, psychological disorders such as post-traumatic stress and depression, functional disabilities, and cosmetic deformities.

Proper management of complications is essential to improve clinical outcomes and quality of life for patients with electrical burns. This involves early detection and timely treatment of infections, physical and occupational rehabilitation to maximize functionality, and psychological care to help patients cope with the emotional and psychological challenges associated with electrical burns.

Discussion

The problem of electrical burns in Mexico is a relevant issue in the field of public health, since it represents a significant challenge in terms of prevention, early diagnosis and proper management. In this section, key aspects related to electrical burns in Mexico will be discussed, including risk factors,

barriers in medical care, prevention strategies, and the importance of public education.

Risk Factors

It is important to understand the risk factors associated with electrical burns in Mexico in order to implement effective preventive measures. Common risk factors include lack of electrical safety training, improper use of electrical equipment, poor or poorly maintained electrical infrastructure, and occupational exposure to high-risk electrical environments. In addition, it has been observed that children and adolescents are especially vulnerable to electrical burns due to their curiosity and lack of awareness about electrical hazards.

Barriers to Health Care

Proper management of electrical burns requires timely and specialized medical attention. However, in Mexico there are several barriers that hinder access to quality medical care for patients with electrical burns. These barriers may include a lack of specialized burn centers, lack of adequate resources, lack of personnel trained in burn management, and lack of awareness among healthcare professionals about updated treatment protocols. In addition, unfavorable socioeconomic conditions and lack of access to health insurance can further limit patients' ability to receive needed care.

Addressing these barriers in healthcare is critical to ensuring that patients with electrical burns receive appropriate treatment in a timely manner. This may involve improving the training of medical personnel in the management of electrical burns, creating specialized burn centers in different regions of the country, and implementing health policies that promote equitable access to health care for all affected patients.

Prevention Strategies

Prevention plays a fundamental role in reducing the incidence of electrical burns in Mexico. Prevention strategies should be implemented at the individual, community, and institutional levels to minimize the risks associated with electrical burns. These strategies may include promoting electrical safety in homes and workplaces, providing adequate training on the safe use of electrical equipment, regularly inspecting electrical infrastructure, and implementing electrical safety standards and regulations.

In addition, it is essential to conduct public education campaigns to raise awareness of electrical hazards and promote safe behaviors. These campaigns

can target the general population as well as high-risk groups such as construction workers and electricians. By fostering a culture of electrical safety and providing clear information about risks and preventive measures, the incidence of electrical burns in the Mexican population can be significantly reduced.

Importance of Public Education

Public education plays a crucial role in preventing electrical burns. It is necessary to promote electrical safety education from an early age, both in school settings and at home. Children and adolescents should receive clear and understandable information about electrical hazards, how to avoid them, and what to do in the event of an emergency situation. It is also critical to educate adults, especially those working in high-risk electrical occupations, about safety best practices and the importance of proper training.

Public education should also address the stigma and discrimination associated with electrical burns, promoting an empathic understanding of patients' needs and fostering social inclusion. By providing accurate information and challenging negative stereotypes, a more conscious and supportive society can be promoted for people affected by electrical burns.

Conclusion

In conclusion, the expanded discussion on electrical burns in Mexico highlights the importance of addressing risk factors, overcoming barriers in medical care, implementing effective prevention strategies, and promoting public education. By adopting a comprehensive approach that encompasses prevention, early diagnosis and proper management, the incidence and complications of electrical burns in Mexico can be reduced. This will improve the quality of life of affected patients and contribute to the construction of a safer and more aware society in relation to electrical hazards.

Conflicts of interest

The authors would like to declare that there is no conflict of interest.

References

1. Moctezuma-Paz, L. E., Páez-Franco, I., Jiménez-González, S., Miguel-Jaimes, K. D., Foncerrada-Ortega, G., Sánchez-Flores, A. Y., ... & Nuñez-Luna, V. (2015). Epidemiología de las quemaduras en México. *Revista de Especialidades Médico-Quirúrgicas*, 20(1), 78-82.
2. Gajbhiye, A. S., Meshram, M. M., Gajjaralwar, R. S., & Kathod, A. P. (2013). The management of electrical burn. *Indian Journal of Surgery*, 75, 278-283.

3. Garcia-Sánchez, V., & Morell, P. G. (1999). Electric burns: high-and low-tension injuries. *Burns*, 25(4), 357-360.
4. Esses, S. I., & Peters, W. J. (1981). Electrical burns; pathophysiology and complications. *Canadian Journal of surgery. Journal Canadien de Chirurgie*, 24(1), 11-14.
5. Haddad, S. Y. (2008). Electrical burn-a four-year study. *Annals of burns and fire disasters*, 21(2), 78.
6. Saracoglu, A., Kuzucuoglu, T., Yakupoglu, S., Kilavuz, O., Tuncay, E., Ersoy, B., & Demirhan, R. (2014). Prognostic factors in electrical burns: a review of 101 patients. *Burns*, 40(4), 702-707.
7. Kopp, J., Loos, B., Spilker, G., & Horch, R. E. (2004). Correlation between serum creatinine kinase levels and extent of muscle damage in electrical burns. *Burns*, 30(7), 680-683.
8. Hanumadass, M. L., Voora, S. B., Kagan, R. J., & Matsuda, T. (1986). Acute electrical burns: a 10-year clinical experience. *Burns*, 12(6), 427-431.

Rodrigo Edmundo Morales Perez
Regional Hospital of High specialty ISSSTE
Veracruz , Mexico