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Research Article

**A STUDY OF ELECTRIC BURNS ADMITTED IN A BURN
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Abstract:

Introduction: The increase in electrical injury rates may be related to the country's rapid industrialization. Prevention must be a priority, and prevention measures must aim to reduce the incidence. Electrical injuries are the fourth most common cause of burns, which remains one of the most serious injuries in developing countries. The Pakistan generally does not report the number of electrical injuries.

Methods and Materials: It is a retrospective cross sectional study

Place and Time: The study is conducted at Allied Hospital Faisalabad from January 2017 to June 2017.

Conclusion: The electric burn injuries are more common in developing and under developed countries. The reason may be poor quality of insulating wires, untrained workers and the lack of specialized health facilities further worsens the prognosis.

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INTRODUCTION:

Burns are common in developing countries and cause serious morbidity and mortality. Burns are also one of the costliest injuries due to the length of hospital stays and the rehabilitation period. Injuries result in higher permanent disability and financial distress for individuals and their families. Electric shock is a type of burn that is the most devastating and the fourth most important cause of hospitalization in the world. This type of lesion affects not only the skin, but also the deeper tissues, resulting in a series of acute and chronic manifestations that are not observed in other burns. People tend to stay longer in hospitals and have much higher morbidity and mortality. The frequency of electrical accidents reported by the Global Burn Center is decreasing. This is partly due to the findings and recommendations of the international research on the electric shock protection program.

Despite this decreasing trend, the number of locally reported injuries is increasing daily. This can be attributed to the fact that the use of high voltages in industrial settings is increasing daily but the individuals handling them are not adequately trained. With the rapid pace of industrializations in the country the trend is expected to rise. The goal of this study is to review and describe the profile and characteristics of electrical burns seen at the Burn Center.

METHODOLOGY:

This is a descriptive type of study of patients presented with electrical injuries in Allied Hospital Faisalabad from January 2017 to June 2017. The study sample consists of 710 patients who got electrical injuries, with or without skin burns, admitted at the Burn Center. Patients were identified in the burn center using the Integrated Surgical Information System (ISIS) of the Department of Surgery. Patient privacy was kept secret; their names were omitted from the charts. The ethical approval was taken from the hospital committee. Two age groups of the study were made, adult with (age 18) and pediatric (age < 18). The patients were categorized as per percentage of the burn according to American Burn Association classification of burn severity. The percentage of total body involvement was termed as minor (10% TBSA [total body surface area]), moderate burn (11–19% TBSA) and severe burn (20% TBSA) based on The type of electrical burn refers to intensity of voltage, high voltage more than (>1000 v) or low voltage less than (<1000 v). Injury was termed as work related injury if it was caused or contributed by exposures or events in the work environment or work place or non-work related. The time taken by the patient to reach hospital was classified as immediate less than 8 hours,

intermediate more than 8 hours and late more than 24 hours to reach health facility. The patients were also categorized as per the length of hospital stay class 1: 1-7 days, class 2: 7-14 days, class 3: more than 14 days 1: none, 2: who had 1 operation, 3: who had more than 2. Subjects were also classified as having morbidity, such as burn infection, pneumonia, and graft loss, as well as mortality, either the patient survived or not. Descriptive statistics were noted based on gender, age, TBSA, mode of injury, type of electrical burn, length of time from injury to admission/referral, types of trauma, types of operations, number of operations and total length of hospital stay.

PATIENT MANAGEMENT

Patients management was done as per the guidelines at the Allied Hospital Faisalabad Burn Center which is based on the American Burn Association Practice Guidelines for Burn Care. All of the cases underwent standard intensive care and surveyed for trauma at the emergency room before admission to the burn center. GCG was done and cardiac monitors were attached, all the base line diagnostic investigations were done. Patients having moderate to major burns were resuscitated with as per parklands formula of resuscitation of patients for maintenance of adequate urine output. All of the patients were given anti tetanus toxoid for immunization against tetanus, prophylactic antibiotics were given, fasciotomy / escharotomy was done in patients having signs of compartment syndrome.

Daily wound dressing with silver sulfadiazine dressing was done that is available in our burn center. The wound status assessment was done on daily basis. Excision, debridement of the necrotic tissue was done along with grafting within 4-5 days and limb amputation was performed after demarcation line formed that is mostly after 7th day. The multi-disciplinary approach was opted for patient care includes anesthesiologists, rehabilitation medicine physician and paediatric. Rehabilitation of the patients included positioning, splinting active and passive exercises.

RESULTS:

A total of 2498 patients were admitted at the Allied Hospital Faisalabad burn Center from January 2017 to June 2017. 710 were patients who suffered from electrical injuries. This study shows that most of the patients admitted, who suffered from electric burns were adult, working males particularly electricians, construction workers or linemen injured at work as shown in Table 1, which is in line with the results of other studies [8]. It is important to note that there are

more number of the injured construction workers than electricians, 542 as compared to 47. The accidental contact of low lying overhead electrical wires by metal poles remained the primary

Table 1:

Independent variable	N%
Male	71.3%
Female	28.7%
Age more than 18	73%
Age less than 18	27%
Place of burn (home)	20%
Office	80%

cause of injury. Table 2 shows that common cause of admission is high voltage electrical injury and is proportional to the severity of the burn, and length of hospital stay.

Table 2

Variable	N%
Type of electrical injury >1000v	81%
<1000v	19%
TBSA minor	33%
Moderate	23%
Severe	44%

Table 3

Variable	N%
Patients with 1 surgery	21%
2 or more surgeries	19%
Types of surgeries, excision	23%
Debridement	28%
STSG	15%
Amputations	12%
Fasciotomy And others	22%

DISCUSSION:

According to 2012 WHO data, deaths due to burn amounted to 195,000 per annum and majority occur in poor and middle-income countries and around half of them occur in the WHO South-East Asia Region [11]. Of the types of burns, the electrical burns are the most distressing one [3]. There are not a good number of studies done on the epidemiology of these burns but some local studies provide some data. The most recent study conducted and published on electrical injury in the Philippine General Hospital was in 1995 [9]. The study had a total of 211 patients of burn admitted and 68 (32.2%) suffered from electrical injuries. In a study conducted by Nable *et al.* in 1997, a total of 149 cases were admitted at the burn Center and electrical burns Reported to be 41.6% of the cases [10]. The frequency of the electrical injury is way higher than in developed countries. An International study done, data shows that electrical injuries amount 5.8% of all burn cases. As Italy (4%), China (6.9%) the USA (3.7%), Taiwan (5.6%) and Singapore (2.8%), [5,12–15]. However,

the ratio among the developing countries having electrical burns admission is 21–27% [16]. The high frequency of burns due to electrical injury may be the result of the low social level of the population, poorly insulated wires, improperly placed and managed electrical appliances and switches, illegal electrical connections, and repair work on the electricity grid done by unprofessional [17].

The demographic results of our study are in line with the study done at various other burn centers of the world. The increase in the incidence of the burn injuries due to electricity can be attributed to the lack of appropriate training and safety education with regards to proper handling of electricity plus the undue and increased exposure to potential hazards [18]. A 10-year study done of retrospective type done in China, which enrolled 383 patients, also showed similar findings. Their patients were mostly male (90.3%), and were usually injured during working hours or in working environment (78.3%) [19].

A study conducted in India reported 84 patients with electrical injuries were analyzed in 5 years from 2004 to 2009 to identify the demographic and causative risk factors. The age of patients reported to be from 3 to 63 years and male's victims were 84.5% [20]. Work place injuries was responsible for the most of these high-voltage injuries, with the most common professionals being victimized are electricians and linemen. These patients usually are younger men in early years of their working lives who are exposed to this high risk due to the reason their occupation involves more exposure to electric injuries, heavy machinery, high voltages, and equipment. This might be due to improper education, equipment, and/or training. Human error also plays an important part in this but proper training and education can negate it, as indicated in other studies [8,21]. Electrical wirings in Pakistan are usually installed low so that they can be reached easily and some are kept very close to homes. A number of cases reported that they got their injuries from contact from these low lying live electricity wires with such objects as umbrellas, metal ladders, metal poles, wrench, etc. Even fixing the cable or TV antenna can be hazardous. The severity of the injuries directly affects the morbidity and mortality due to burn injuries includes severity of the burn injury, level of the specialized health care available. The decrease in burn related deaths may be due to high facilities available in modern burn centers. [28] but some patients that died before getting proper medical assistance can be categorized at institutional level as three variants in burn injuries. 1. death on the scene, 2 deaths during transportation, 3. death in hospital in spite of the treatment. electrical injuries [26]. In the USA, the most common cause of death post electrical injury reported to be cardiac arrest due to acute arrhythmias at the site of the accident [29].

Post injury, the quality of work and life of patient with electrical burns suffer. Most patients report significant difficulty in returning to work. The dynamics of the returning to work place and environment are known to be much worse than reported in general burn literature [30].

CONCLUSION:

The rapid increase in the incidence of the electrical burns may be linked to the country's pace of industrialization, when proper safety education and training with regards to proper handling of electricity is overlooked and underestimated. With this, the workforce of the professionals may be severely affected as most of the victims are males of working age. Not only that, care for these burn wounds is a long

and costly and most of these patients are the only working hand for their family.

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