

Thermal Injury in Newborns and Infants within the First 6 Months of Life

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ABSTRACT

Background: The skin of newborns is very thin and sensitive to burns. In this age group, the mortality rate is very high. Burns account for approximately 2 million injuries annually in the United States alone out of which 500,000 cases need medical treatment and 100,000 cases require hospitalization. This study aimed to determine the incidence and magnitude of the injury, mortality rate, and causative agent in newborns and neonates within the first 6 months of life admitted to a burn unit.

Methods: The documents of all burned infants admitted to Imam Reza hospital of Mashhad, Iran, were retrospectively analyzed within 2001-2011.

Results: A total of 447 burns were admitted to this ward for 10 years. Twenty-five (6%) cases were in the first 6 months of life. Three (12%) cases were newborns (within the first 28 days of life). In addition, 15 (60%) cases were female. The mean age on admission was 5.3±1.2 months (a minimum of 3 days and maximum of 6 months). The mean total body surface area of burns was 23±15 percentile. The duration of hospital stay was 14±18 days, and the mortality rate was 12%. The source of burns was hot water (e.g., tea) and fire with 80% and 16%, respectively. Moreover, one (4%) case was a newborn that burnt in lower extremities due to the malfunction of the incubator.

Conclusion: The results of this study were the same as the findings of the studies conducted around the world. Hot water and fire were the most frequent sources of burns. Furthermore, females were injured more frequently than males.

Keywords: Burn injury, Epidemiology, Newborn

Introduction

The skin of newborns is very thin and sensitive to burns. In this age group, the mortality rate of burns is very high. Burns account for approximately 2 million injuries annually in the United States alone out of which 500,000 cases need medical treatment and 100,000 cases require hospitalization. Approximately 50% of burns occur in the pediatric population, with children younger than 5 years representing 17% of the reported burn cases (1). Infants and children are unique patient populations that demonstrate the increase of susceptibility to death. Not only young children have limited physiologic reserves but also their patterns of injury are very different from those reported for adults.

Although thermal burns secondary to scale or

flame are by far the most common etiologies in children and adults, the injuries from chemical and electrical burns may be devastating and require early recognition and treatment. Pediatric burn diagnosis and management is complex and requires the expertise of a multidisciplinary team.

Epidemiological data on burns should provide vital information for developing strategies to reduce the frequency of the injuries and establish effective methods for burn management in emergency rooms and burn units. On the other hand, children with burns need special attention because they may have long-term physical, psychological, economic, and social loads. With this background in mind, this study was conducted to determine the incidence and magnitude of the injury, mortality rate, and

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causative agent in newborns and neonates within the first 6 months of life who were admitted to a burn unit.

Methods

The documents of all burned infants admitted to Imam Reza hospital of Mashhad, Iran, were retrospectively analyzed within 2001-2011. All the information was analyzed using SPSS software (version 16). The statistical results of the normal distribution of variables for data measurement were given as mean±standard deviation, and the statistical results of variables for data enumeration were explained as case number or percentage.

Results

A total of 447 burns were admitted to the burn ward for 10 years. Twenty-five (6%) cases were in the first 6 months of life. Three (12%) cases were newborns (within the first 28 days of life). In addition, 15 (60%) cases were female. The mean age on admission was 5.3±1.2 months (a minimum of 3 days and maximum of 6 months). The mean total body surface area (TBSA) of burns was 23±15 percentile. The duration of hospital stay was 14±18 days, and the mortality rate was 12%. The source of burns was hot water (e.g., tea) and fire with 80% and 16%, respectively. Moreover, one case (4%) was a newborn that burnt in lower extremities due to the malfunction of the incubator.

Discussion

The incidence of burns in neonates has been reported following the use of pulse oximeters, phototherapy blankets, various electrodes, and chemical disinfecting agents. Neonates are very vulnerable to burns with high mortality and morbidity and high risk of infection and sepsis. Indeed, those with larger burns may remain permanently disfigured. On the other hand, the studies conducted on animals and humans suggest that neonatal and early infant traumatic and painful injuries, such as burns or stressful experiences, can induce global long-term alterations in sensory and pain processing (2).

The epidemiology of the patients with burns is different not only from one country to another but also from one region to another because of different social and cultural characteristics (3-10). The highest and lowest incidence rates of hospitalized pediatric burned patients are in Africa and Americas. Furthermore, Europe, Middle East, and Asia have similar figures, but the larger

population of Asia includes over half of the world's pediatric population (11).

Cox et al. studied thermal injury within the first 4 months of life. They examined 86 patients under the age of 4 months who were admitted over 10 years duration. The admission rate was 0.34%, and hot water and fire were the first and second causes of burns. The TBSA was within the range of 1-55%, with an average of 11.5% (12), which is the same as that in our study.

Rimdeika et al. conducted a case report on preterm male twins delivered in a community hospital. After the delivery, they were placed on water warmers for 15-20 min and then transported to an incubator. An hour after the delivery, one twin with a birth weight of 1500 g had an injury of 20% TBSA on his dorsum, waist, and buttocks. In addition, the other one with a birth weight of 1835 g had an injury of 14% TBSA in the same areas (13).

McMullin et al. reported a thermal injury to the tongue during suspension laryngoscopy (14). In our study, the females were affected more frequently than males. Nevertheless, in a study conducted by Ramakrishnan et al., there was no difference in gender in terms of mortality. However, Wang et al. in a study carried out on 2,894 children with burns founded that males were predominant than the females (62.4% vs. 37.6% with a male: female ratio of 1:0.6) (15). The proportion of children with burns in a study performed by Wang et al. was 28.6%, within a range of 13.5-59.6% (3-11-12). Nevertheless, in our study, it was reported as 6% because we studied a limited age group. In this regard, our results are similar to the findings of a study carried out by Cox et al.

There are many reports about transilluminator burns. Robert et al. reported a female infant with a birth weight of 900 g and 32 weeks of gestation. The infant's left wrist was transilluminated to facilitate the puncture of the radial artery. The transilluminator was placed on the dorsum of the left wrist for approximately 1 min (16). Marissa et al. reported an outbreak of erythematous papules and vesicles in four neonates whose lesions arose within 72 h in a neonatal intensive care unit (NICU) because of a faulty transillumination device (17).

Transillumination with high-intensity fiberoptic light source is effective for the diagnosis of pneumothorax and localization of the arteries and veins for blood sampling. It has been used in NICUs since the 1970s. Thermal burns were initially reported with this technique, but this

complication is now infrequently used because of numerous safety precautions (18). Scalding is the predominant cause of burns and accounts for 84% of all cases which are near to our cases with 80% of burns due to hot water (e.g., tea). In Iran, drinking tea is a common custom.

A high degree of injury has indicated that intervention in children with burns is of great importance because prevention is always more efficacious than treatment. The effect of mass media, including newspapers, television, and radio, as well as education by schools, should be strongly emphasized in transmitting the knowledge of prevention from burns and scald from the various causes, in particular, and performing the supervision of public opinions.

Conclusion

The results of this study were the same as the findings of the studies conducted around the world. Hot water and fire were the most common sources of burns. In addition, the females were injured more frequently than males.

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Conflicts of interest

All the authors declare that there is no conflict of interest.

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