

BURN INJURIES IN CHILDREN AND ADOLESCENTS: CLINICAL AND EPIDEMIOLOGICAL CHARACTERIZATION

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ABSTRACT

Burns are important causes of morbidity and mortality in children and adolescents whose effects are reflected in significant functional limitations. This is a descriptive, quantitative study aimed to characterize the clinical and epidemiological profile of children and adolescents victims of burns admitted to a referral Hospital of Joao Pessoa, Brazil, from January 2007 to December 2009. The majority of victims were infants (37%), preschoolers (33.2%) and boys (54%). The incident mostly occurred at home (85.5%) by accident (90%) and scalding (69.6%). Second-degree burns were predominant in 62.6% of cases and about 24.2% of the sample developed complications and secondary infection was the most common (12.1%). Balneotherapy is one of the most common procedures. We conclude that education programs at schools, community centers and in the media need to be strengthened since most injuries occur in the home environment and could be prevented.

Descriptors: Accident prevention. Burns. Infant mortality.

RESUMO

As queimaduras constituem importantes causas de morbimortalidade infanto-juvenil, cujas repercussões refletem em significativas limitações funcionais. Trata-se de um estudo descritivo, de natureza quantitativa, que objetivou caracterizar o perfil clínico-epidemiológico de crianças e adolescentes vítimas de queimaduras admitidas em um Hospital de Referência de João Pessoa, Brasil, de janeiro de 2007 a dezembro de 2009. A maioria das vítimas compõe-se de lactentes (37%), pré-escolares (33,2%) e do gênero masculino (54%). Os eventos ocorreram, principalmente, no domicílio (85,5%), acidentalmente (90%) e por escaldamento (69,6%). Predominaram as queimaduras de 2º grau, em 62,6% dos casos, e cerca de 24,2% da amostra evoluíram com complicações secundárias, sendo a infecção a mais comum (12,1%). A balneoterapia foi um dos procedimentos mais realizados. Conclui-se a necessidade em intensificar programas educativos nas escolas, nos centros comunitários e meios de comunicação, já que grande parte dos acidentes ocorreu no ambiente doméstico, podendo ser evitados.

Descritores: Prevenção de acidentes. Queimaduras. Mortalidade infantil.

Título: Queimaduras em crianças e adolescentes: caracterização clínica e epidemiológica.

RESUMEN

Las quemaduras constituyen importantes causas de morbimortalidad infanto-juvenil cuyas repercusiones reflejan en significativas limitaciones funcionales. Se trata de un estudio descriptivo, de naturaleza cuantitativa que objetivó caracterizar el perfil clínico-epidemiológico de niños y adolescentes víctimas de quemaduras admitidas en un Hospital de Referencia de João Pessoa, Brasil, de enero del 2007 a diciembre del 2009. La mayoría de las víctimas fue lactante (37%), preescolar (33,2%) y de género masculino (54%). Los eventos ocurrieron principalmente en el domicilio (85,5%), accidentalmente (90%) y por escaldamento (69,6%). Predominaron las quemaduras de 2º grado en 62,6% de los casos y cerca del 24,2% de la muestra evolucionaron con complicaciones secundarias, siendo la infección la más común (12,1%). La balneoterapia es uno de los procedimientos más realizados. Se concluye la necesidad en intensificar programas educacionales en las escuelas, centros comunitarios y medios de comunicación ya que gran parte de los accidentes ocurrió en el ambiente doméstico pudiendo ser evitados.

Descriptores: Prevención de accidentes. Quemaduras. Mortalidad infantil.

Título: Quemaduras en niños y adolescentes: caracterización clínica y epidemiológica.

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INTRODUCTION

Burn injuries are considered a worldwide major public health problem, with high mortality rates for this type of injury⁽¹⁾. When they do not lead to death, depending on the severity and level of commitment, they can cause serious sequelae, i.e., significant functional, psychological and social limitations⁽²⁾.

This type of event, at different ages, is the third leading cause of death from trauma and the second in children younger than four years of age, which in most cases result from an accidental event. It is estimated that in Brazil there are about a million burn accidents every year, of which only 200,000 patients seek hospital care, which highlights significant national underreporting⁽³⁾.

In the United States of America, burn accidents were responsible for 282,000 and 322,000 deaths in 1998 and 2002, respectively, featuring this type of injury as the fifth leading cause of violent deaths in the world⁽²⁾.

In 2006, 16,573 children and adolescents under the age of 15 were hospitalized due to burn injuries, representing 14% of all hospitalizations resulting from external causes in this age group in Brazil. In that year, burns were responsible for 373 deaths in children under the age of 15 in our country. The main causes of burns in that age group are related to accidental events in the home environment, of which scald burns or lesions caused by heated liquid are the main agents responsible for this type of trauma⁽⁴⁾.

Despite statistical evidence, epidemiological data related to burn injuries per region of the body are still scarce. Therefore, it is important to note that obtaining such information and an epidemiological design are essential to characterize the population affected as well as the circumstances under which these injuries occurred. Moreover, this diagnostic analysis is a contribution so that local institutions involved in providing assistance can plan strategies to control and prevent trauma by identifying the problem in order to reduce hospital demand and prevent mortality rates from burns in the child and adolescent population.

Accidents due to this type of injury require specific attention and a preventive approach. It is

understood that professionals from different fields of knowledge, such as education and health, can contribute to primary care service by guiding parents, guardians, and the child about the environmental hazards around them and provide assistance to prevent them⁽⁵⁾.

One of the effective ways to prevent childhood accidents is the direct participation of the family and school, as they are responsible for educating the children and adolescents. Therefore, preventive approaches and behaviors should begin in the family environment and at school engaging children and their guardians.

Culture, customs and beliefs are essential factors for the implementation of care and prevention of further accidents at home. These, in most cases, are enhanced by non-observance, life habits and lack of preventive behavior by the families. Meanwhile, knowledge about burn accidents among children and adolescents should be based on a cultural and family perspective so that not only the cure, but prevention of further accidents⁽¹⁾ be valued by them.

Currently, one of the objectives of the School Health Program (SHP), established under Law No. 6286, promulgated on December 5, 2007, is to contribute to the education of students through strategies of promotion, prevention and attention to health with the purpose of addressing the vulnerabilities, accidents and/or violence that undermine the full development of children, such as burn injuries.

Thus, it is understood that both the home and school environments are essential for the promotion of health and full development of citizenship, which implies the development of attitudes and values that lead children and adolescents to practices that lead to health.

Given the above, the relevance of this study was to characterize the clinical and epidemiologic profile of children and adolescents who have suffered burn injuries and were admitted to a referral hospital in João Pessoa (PB) from January 2007 to December 2009.

METHODOLOGY

This is an epidemiological, documentary, quantitative, descriptive, retrospective study based

on the data from the records of the Medical Record System and Statistics (SAME) at a public referral hospital for burn injuries in the city of João Pessoa (PB) between October 2009 and March 2010. Data collection occurred on Mondays, Wednesdays and Fridays by consulting the medical records of children (younger than 10 years) and adolescents (aged 10 to 19 years) admitted to the Burn Care Unit (BCU) from January 2007 to December 2009, totaling 289 medical records. The inclusion criteria were as follows: medical records of children and adolescents of both genders with a clinical diagnosis of burn injuries; medical records of children and adolescents who were receiving follow-up at the Burn Care Unit (BCU) for at least 24 hours. The exclusion criteria were: medical records whose legal guardians of the children and adolescents had signed the liability waiver of discharge against medical advice and treatment dropout.

For the transcription of the data, a previously tested form was used consisting of twenty objective questions, which were divided into three parts. The first part contained data on demographic characteristics (age, gender and origin), and hospitalization; the second contained information regarding the records of burn injuries and their characteristics (site of the injury, cause of burn injury, aggressive agent, level of lesion complexity, depth of burn, and local secondary complications of burns); and the third, the number of deaths resulting from this injury and the type of assistance provided (professionals involved in the care provided to the child and adolescent and procedures used during the hospitalization of the victims). The research project was approved at the 11th Ordinary Meeting by the Research Ethics Committee of the University Center of João Pessoa (UNIPÊ) under protocol No 036.

For organized systematization and data analysis, we used the Excel 2007 edition, whose results were presented by means of descriptive statistics and the variables were organized in tables by the distribution of absolute, relative, mean frequency and standard deviation.

RESULTS AND DISCUSSION

The demographic characteristics presented in Table 1 show that of 289 young patients admitted

to the Burn Care Unit in this study between 2007 and 2009 (107), 37.0% were infants, (96) 33.2% were preschoolers (39), 13.5% were elementary schoolers, and (47) 16.3% were adolescents, in agreement with another study (5) in which the prevalence of burn patients also occurred in the age group totaling 61.4% of the referred cases. The majority of patients in this sample were boys (156; 54.0%) and they came from the interior of the state (55.0%).

The reason why most of the sample consisted of boys can be attributed to the greater willingness of boys to play risky games and therefore be more exposed to the causative factors of burns. Moreover, the neuropsychomotor development of children between one and two years of age is intense, marked by enthusiasm and curiosity to explore the environment where they live.

One justification for the high demand for care at the Burn Care Units (BCU) in the Brazilian capitals, as found in this study, is often due to the lack of infrastructure and access to services offered in interior cities that do not offer assistance for this type of injury. The physical space in the hospital environment meets all the material, physical and human conditions needed for the burn victims under treatment in the specialized units of the BCU. Indeed, the search of the population for systematized services overloads the care centers of the capitals, undermining the effectiveness and quality of the service offered.

The average length of stay of children and adolescents was 5.87 days (± 3.56), lower than the average obtained in other studies⁽⁶⁻⁷⁾ that stated 11.89 and 16.32 days of hospitalization, respectively. Some explanations for the high diversity found in the results of the research regarding this variable is based on the severity of the injury and possible presence of complications arising from burns, which are important factors for determining the period of hospitalization of the victim.

Although no significant differences in relation to the occurrences per year of burn injuries were found, there was a small change in variation regarding the notification of burn injuries with 98, 95 and 96 cases for the years 2007, 2008 and 2009, respectively.

With regard to monthly occurrences of burn injuries within the time interval studied, it was

Table 1 – Demographic characteristics of children and adolescents admitted to the Burn Care Unit in a referral hospital for burn injuries, João Pessoa, Paraíba, Brazil, 2007-2009.

Variables	n	%	Mean Stand Deviation	
Age group				
Infants (< 2 years)	107	37.0		
Preschoolers (2 to 6 years)	96	33.2		
Elementary schoolers (7 to 9 years)	39	13.5		
Adolescents (10 to 19 years)	47	16.3		
Gender				
Girls	133	46.0		
Boys	156	54.0		
Origin				
Capital	127	44.0		
Interior of the state	159	55.0		
Other states	3	1.0		
Days of hospitalization				
One to five days	125	43.2	5.87	± 3.56
Six to ten days	153	53.0		
More than ten days	11	3.8		
TOTAL	289	100.0		

Source: Research data (2010).

also observed that the accidents happened during all the months with few variations. However, June had the highest number of incidents with 65 cases (22.4%), followed by March (54, 18.6%) and February (52, 17.9%). One reason for the increase in burn injuries in June, as pointed out in another study⁽⁶⁾, may be related to the bonfire festivities celebrated with great intensity at this time of year, especially in Northeastern states where it is tradition to use fireworks. These are often handled not only by adults, but especially by children, increasing the risk of accidents.

Burns injuries have become increasingly common among the child and adolescent population, where the variables of the aggressive agent, site and reason of the occurrence, shown in Table 2, have an increasingly more common homogeneity pattern among studies that research this topic⁽¹⁻³⁾.

With regard to the site of the occurrence of burn injuries, as another study showed⁽⁸⁾, Table 2

shows that most of them, (247) 85.5%, occurred in the domestic environment. Approximately (11) 3.8% of the accidents occurred in locations outside the houses and for (31) 10.7% of the victims the location of the accident could not be identified due to the lack of information in the medical records. Among the home rooms more susceptible to this type of injury, the kitchen is the most cited in the literature⁽⁹⁻¹⁰⁾ probably due to the location and easy access to the main causative agents. In this research, it was not possible to obtain this information because this variable was not included among the records contained in the medical records.

Regarding the reason of the accident, also described in Table 2, it was found that the prevalence of burn injuries resulting from non-deliberate causes, that is, most of them being accidents, correspond to (260) 90.0%. Approximately (3) 1.0% resulted in injuries caused by maltreatment and it was not possible to identify

Table 2 – Distribution of burn injuries according to location, reason of injury, and aggressive agent. João Pessoa, Paraíba, Brazil, 2007-2009.

Variables	n	%
Location of injury		
Home	247	85,5
Another location	11	3,8
Not informed	31	10,7
Reason of injury		
Accidental	260	90,0
Maltreatment	3	1,0
Not informed	26	9,0
Aggressive agent		
Heated liquid	201	69,6
Flame	43	14,9
Heated surface	25	8,7
Electricity	11	3,8
Chemical substance	5	1,7
Not informed	4	1,3
TOTAL	289	100

Source: Research data (2010).

the reason for the occurrence in (26) 9.0% of the cases due to lack of information on the medical records. These results support studies that address this issue^(6,11), which also show that most burn accidents are related to unintentional or accidental activities, mainly in the domestic environment and the victims are the child population. Given these facts and other results reported in the previously mentioned literature, it is believed that most burn injuries could be prevented by implementing and enhancing educational programs at schools, community centers, and by preventive measures via the media, such as radio and television, as the occurrence of severe accidents at the home environment is high.

However, it is important to note that prior understanding of the professional about the cultural diversity of the families of the children and adolescents victims of burns is a key aspect for the development of actions directed to the reality of each family⁽¹⁾.

Another variable researched was the type of aggressive agent. It was found that (201) 69.6%

of the records of burn injuries occurred in these past three years mainly resulting from contact with hot liquid. The second more frequent agent in this sample was flame with (43) 14.9% of cases. In sequence, burn injuries caused by heated surface (25, 8.7%), electricity (11, 3.8%), and chemical substances (5, 1.7%) were also present. It is noteworthy that in (4) 1.3% of the medical records there was no information about the causative agents (Table 2).

The results support other findings in the literature^(6,11-12), which also identified scalding as the main responsible for burn accidents, followed by injuries caused by flames and contact with a heated area.

Burns in children younger than seven years of age lead most of the epidemiological studies in the world literature about burns. This is probably due to the characteristics of curiosity, restlessness and children's unawareness of danger that favor these episodes in this population. A study⁽¹³⁾ corroborates this hypothesis and emphasizes the relationship of this fact with the poor conditions

of household utensils and crowding of children in the kitchen with their parents, especially the mother, during the preparation of meals with heated liquids. This condition, also known as “hot kettle syndrome”, occurs, in most cases, from the child’s attitude of moving the container with boiling water from the cooker.

Unawareness of risk situations and neglect of adults in relation to this type of injury is one of the factors that contribute to the high rates of injuries in children. To minimize this type of trauma, children must be carefully supervised by their parents, especially when they are in places that offer danger to the occurrence of this type of accident⁽¹⁴⁾.

It is noteworthy that the effective participation of health professionals by means of preventive actions directed to this audience at schools and communities could also minimize accident rates and therefore, they are considered essential⁽¹⁵⁾.

Within this context, it is clear that health professionals in primary care, especially nurses, play a key role in helping prevent home accidents as they can offer educational guidance because they are part of the community. They can also motivate behavior changes that can help minimize accidents from burn injuries because they are in close contact with the families.

With regard to the complexity of the lesion in relation to its extension, it is clear that in our sample (179) 62.0% of the lesions showed medium complexity, (109) 37.7% high complexity and only one case showed low complexity. According to the literature⁽⁹⁾, determining the body area affected is essential because it specifies the severity of the lesion. In addition, minimal lesions in children, i.e. around 20% of the body surface, can be considered serious in comparison with the same percentage in adults, because the lesion affects a greater surface area in relation to the child’s weight. A data that called out attention in this study was the significant number of medical records that did not contain adequate records about this information, making further analysis impossible. A study⁽¹⁶⁾ reports that due to the lack of information described in medical records, real analysis about the events is impaired. This fact reflects the omission of information in the medical records, resulting in underreporting of actual cases when patients are admitted.

The present study found that the most affected body areas are the trunk, upper and lower limbs, although some studies^(5,12) show that the head region is the most affected area. Identifying the body area affected⁽¹⁷⁾ is important for evaluating the risk of the injury because it could be associated with significant anatomical, physiological, endocrinological and immunological alterations that need care to prevent or minimize the extent of damage.

With regard to the depth of the lesion, there was a predominance of second-degree burns in (181) 62.6% of the cases surveyed. In sequence, we found combined first- and second-degree burns, but second- and third-degree burns were the most frequent in (39) 13.4% and (23) 7.9% of the cases reported, respectively. Approximately (2) 0.6% of the patients still suffered first-degree burns and in (22) 7.6% of the cases it was not possible to obtain this information.

Isolated first-degree burns were frequently lower than those found in another study⁽¹⁶⁾, which stated a percentage of 19%, and according to the same study, the small amount of records and evidence about first-degree burns in many studies may be related to the different lesions at the time; due to this, the professionals responsible for providing assistance considered only the most severe lesions at the time of recording them on the medical record thus, under notifying the real data about the severity of the injury. Added to this, individuals affected by minor clinical repercussion do not seek medical treatment for this type of injury, possibly reducing the number of records.

Approximately 24.2% of children and adolescents with burns developed secondary complications. Among the most common and prevalent complications during the period of hospital admission was secondary infection (12.1%). A study (18) indicates that the occurrence of infection in burn patients depends on the characterization of the variables, including body surface area affected, immunosuppression, duration of hospitalization, surgical procedures, and diagnoses. Moreover, it is noted that Gram-positive bacteria are present in about 66% to 88% of cases of contamination in burn patients and colonization may be of endogenous origin as well

as acquired⁽¹⁸⁾. Dehydration 29 (10%), necrosis (2; 0.6%), flictena (2; 0.6%), septic shock (1, 0.3%), and cardiac arrest (1, 0, 3%) were the second most common complications.

With regard to the professionals involved in the care of burn patients, it was found that the medical and nursing professionals offered 100% of assistance, followed by psychologists and physiotherapists with 237 and 172 consultations, respectively, and last social assistants (59) and nutritionists (15).

The most common procedures that patients have undergone were balneotherapy, analgesia, debridement, skin grafting, antibiotic therapy, and plastic surgery. The choice of the type of procedure depends on the area and severity of the lesion, since determining treatment for burns requires individual attention to each affected area.

Balneotherapy is an important intervention used in most studies that address clinical treatment for burns whose goal is to reduce contamination of the areas affected. The procedure is performed at the Burn Therapy Center by monitoring the patient's vital conditions since mechanical cleaning by applying manual friction to the injured tissue may be susceptible to intercurrents⁽¹⁹⁾. Perhaps, the rationale for analgesia appears as the second most frequently performed procedure by the team due to the large number of second-degree injuries, which are characterized by significant episodes of pain requiring the use of medications to reduce it. Furthermore, probably mechanical cleaning is needed, a prerequisite for balneotherapy, which may also explain the high demand for analgesics.

One aspect that drew attention in this study was the small number of interventions involving play therapy. Only 29 records reported using play therapy when the majority of the individuals affected in the sample were children. This makes us reflect on the need for professionals in the health area who associate conventional interventions with this type of treatment because play therapy helps recovery, minimizes the impact of the hospitalization process and, above all, promotes an emotional bond between the therapist and the child.

As for the number of deaths identified at the Burn Care Unit in three years studied, a total of 5 deaths occurred, one in 2008 and four in 2009.

It is important to point out that this mortality rate can be considered comparable or even lower than some results in the literature⁽⁶⁾. These results indicate that early humanized care associated with an improvement in human and technological resources may have contributed positively to the reduction in the number of deaths and improvement of the living conditions and rehabilitation of burn patients⁽²⁰⁾.

FINAL CONSIDERATIONS

Burns are a potentially severe trauma, not only due to the physical impairments, which dependent on the severity of the injury, but also to the high mortality rates. The events identified in this study were prevalent in the child and adolescent population and they occurred in the home environment resulting from accidental causes. Moreover, the events caused by scald burns are also the most frequent agents in this type of injury. Although death rates were lower when compared with other studies, the hospital stay, physical and emotional sequelae, and complications justify the need for preventive measures. In this sense, measures for health education are needed in the district researched that offer guidance and information about how to prevent burn accidents because, as noted in the records, most are preventable.

Access to culture, beliefs and habits of the family life is essential for health professionals to help plan preventive activities based on the reality experienced by each family. Thus, better care and quality of life could be offered to burn victims.

We also identified gaps in the records or "incompleteness" of some important data for the analysis of the clinical and epidemiological profile of children and adolescents who are burn victims. Thus, further research is needed about the obstacles that impede adequate recording on the medical records when patients are receiving care from health professionals. Records must be filled out in a responsible and committed manner because it represents the written communication among services, i.e, it can indicate the incidence and prevalence of certain diseases, the profile of care, and also serve as reference material for teaching and research.

Further studies on pediatric burn patients need to be conducted in other health care centers in the municipality in order to map the problem and propose effective interventions according to the identification of the weaknesses of each location and the population studied.

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