

The Epidemiology of Cold-weather Injuries in Infants in Mashhad, Iran

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ABSTRACT

Background: Injury is a leading cause of morbidity and mortality in children. There is insufficient data on the epidemiology or incidence of injuries in the first two years of life, especially in Iran. The main objective of this study was to describe the incidence and causes of injuries in a sample group of infants and toddlers in Mashhad, Iran.

Methods: This prospective, observational study, was conducted on 1000 infants (6-24 months old), admitted to 46 healthcare centers of Mashhad. The infants were observed in terms of the occurrence of injuries and the outcomes over six months.

Results: At the beginning of the study, the mean age of the infants was 13.8 ± 7.8 months. During six months of observation, 382 episodes of injuries were detected. The injuries were burning (134 episodes), falling (132 episodes), cuts and lacerations (63 episodes), choking due to foreign body aspiration (40 episodes), poisoning (9 episodes), traffic accidents and electrical injuries (2 episodes each) and drowning (no case), respectively. During the study period, 42 injury-related outpatient visits (by a physician) were recorded, which were caused by burning (28 visits), falling (13 visits) and traffic accidents (one visit), respectively. Twenty-one cases of hospital admission were reported, although only two of them were caused by accidents (a case of falling and a case of burning).

Conclusion: During the cold months, burns and falls were the main causes of injury in children, aged 6-24 months in Mashhad. However, injury was not a major cause of hospital admission in this group.

Keywords: Burning, Infants, Injury, Injury Prevention, Mashhad

Introduction

Childhood injuries are a major global public health concern (1). Infants under one year of age are less vulnerable to accidental injuries, since they are relatively incapable of movement and are closely supervised by their families. Exploration of the surroundings is an essential part of toddlers' development. However, their lack of knowledge about many environmental hazards places them at a great risk of injury.

A better management of malnutrition and infectious diseases, injuries have become the leading cause of death in children in developing countries and the industrialized world (1). Since 1960, unintentional injuries have been the leading cause of death in children over one year of age in Japan (2). In addition, in USA, injuries are the

leading cause of children's death after the first year of life, followed by congenital anomalies, which are three times less frequent (3).

The report by Injury Surveillance System (ISS), established by the Iranian Ministry of Health, has shown that hits (i.e., being hurt by any sharp or blunt object or injury due to collision with an object) (28.3%), traffic accidents (22.9%), falling (17.7%) and burns (9.8%) were the four leading causes of emergency injury-related admissions in Iranian children, less than 13 years of age (4).

The aim of this study was to determine the most common injuries in infants. It can help us to use strategies for preventing of such injuries in infants.

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Method

This cross-sectional, descriptive study was conducted from November 2005 to May 2006. This study included 1000 infants and toddlers (6-24 months old), who had referred to the healthcare centers of Mashhad for routine vaccination. Random cluster sampling was applied for selecting the participants. Each healthcare center (total=46) was considered as a cluster. The number of participants was determined proportional to the number of children younger than two years of age at each center.

A questionnaire, containing 35 items on different childhood injuries over the past month, was prepared. Ten healthcare workers were trained to complete the questionnaires. First, a face-to-face interview was conducted with the caregiver, and then, the same healthcare worker made monthly phone calls to obtain further information. Two supervisors observed and checked the questionnaires by reviewing the completed forms and calling the parents.

Table 1. Demographic characteristics of the subjects

Age	Mean=13.8 months	SD=5.27
Birth weight	Mean= 3252 g	SD=1428.1
Number of siblings		
No siblings	1 (n)	0.2 (%)
1	287 (n)	56.8 (%)
>2	217 (n)	43.1 (%)
Maternal occupation		
Employed	923 (n)	94.7 (%)
Housewife	52 (n)	5.3 (%)
Attending day care centers		
Positive	932 (n)	96.9 (%)
Negative	30 (n)	3.1(%)
Use of private vehicles		
None	495 (n)	50.7 (%)
Car	298 (n)	30.5 (%)
Motorcycle	184 (n)	18.8 (%)
Insurance coverage		
No	563 (n)	57.3 (%)
Yes	419 (n)	42.7 (%)
Feeding		
Formula	59 (n)	6 (%)
Breast milk	924 (n)	94 (%)
Overt developmental delay		
No	952 (n)	907.3 (%)
Yes	26 (n)	2.7 (%)
Congenital diseases		
No	964 (n)	98.1 (%)
Yes	19 (n)	1.9 (%)

The collected data were analyzed, using SPSS version 11.5. Descriptive statistics such as frequency distribution and percentage calculations were performed.

Results

At the beginning of the study, 1000 infants and toddlers were enrolled. However, during six months of observation, ten children missed the follow-up sessions. Table 1 shows a summary of the demographic data of the study population. The mean age of the participants during the first mothers were housewives. Only 3.1% of the interview was 13.8 (± 7) months. In total, 94.7% of children were attending day care centers and 2.7% had some degree of developmental delay (varying from speech delay to gross motor delay).

During the six months of observation, 382 episodes of injury were detected. Burns and falls with almost equal frequencies (134 and 132 episodes) were the cause of 69.6% of all injuries. The rest of the accidents were due to cuts (63 episodes), choking (40 episodes), poisoning (9 episodes) and electrical injuries/traffic accidents (2 episodes each), respectively; no case of drowning was reported (Table 2).

Table 2. The frequency of different types of injuries during six months of observation

	Number	Percentage
Burns	134	13.4
Falls	132	13.2
Cuts	63	6.3
Choking	40	4
Poisoning	9	0.9
Traffic accidents	2	0.2
Electrical injuries	2	0.2
Drowning	0	0
Total	382	38.2

Table 3. The frequency of injury-related physician visits in 1000 infants in Mashhad (Nov 2005-May 2006)

	Number	Percentage
Burns	28	2.8
Falls	13	1.3
Cuts	0	0
Choking	0	0
Poisoning	?	?
Traffic accidents	1	0.1
Electrical injuries	0	0
Total	42	4.2

Table 4. The frequency of injury-related hospital admissions in 1000 infants in Mashhad (Nov 2005-May 2006)*

	Number	Percentage
Burns	1	0.1
Falls	1	0.1
Cuts	0	0
Choking	0	0
Traffic accidents	0	0
Electrical injuries	0	0
Total	2	0.2

*During the study, 19 cases of non-injury-related admissions were reported

Table 3 and 4 demonstrate the frequencies of physician visit and hospitalization rate in each different types of injuries during the study. As these tables indicated, although poisoning was not a common accident, it led to physician visits or emergency admissions in more than 30% of cases; this rate was estimated at 23.9% for burns.

Discussion

Pediatric injuries are a major global public health concern (1). With a better management of malnutrition and infectious diseases, injuries have become the leading cause of death in children in developing countries and the industrialized world (1).

Children under one year of age are less vulnerable to accidental injuries, since they are relatively incapable of movement and are closely supervised by their families. Exploration of the surroundings is an essential part of toddlers' development. However, lack of knowledge about many environmental hazards places them at a great risk of injury.

The majority of injuries have been reported during emergency visits or at hospital discharge; it should be mentioned that the rate of reported accidents is not indicative of all accidents. The valuable advantage of this study is that its data was collected in real time.

Similar to our study, the Avon Longitudinal Study of Parents and Children (ALSPAC), which was a large population-based study, reviewed the history of injuries in 14,000 infants in UK. The parents were asked to describe any accidents in the first six months of infant's life. This study found that the periodic prevalence of injuries in infants was 23.5% (5). Also, in Scotland, 55% of pediatric emergency referrals were due to injuries and 38% of infants were admitted for inpatient management (6).

In Japan, since 1960, unintentional injuries have been the leading cause of death in children over one year of age (2). Moreover, injuries are the leading cause of children's death after the first year of life in the US, followed by congenital anomalies, which are three times less frequent (3).

The report by the Injury Surveillance System (ISS), established by the Iranian Ministry of Health, has shown that hits (i.e., being hurt by any sharp or blunt object or injury due to collision with an object) (28.3%), traffic accidents (22.9%), falling (17.7%) and burning (9.8%) were the four leading causes of emergency department referrals due to injury in Iranian children under 13 years of age (4).

A hospital-based study on childhood injuries in California investigated the main cause of injury during three-month periods in children younger than 18 months of age. The results showed that falling (0-2 months), battering (3-5 months), falls (6-8 months), foreign body aspiration (9-11 months) and hot liquid and vapor injuries (12-17 months) were the leading causes of accidents (17). Moreover, Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) has shown that in children less than seven years of age, the most common causes of injuries attended at emergency departments were falling (60.4%), choking on food (7.6%) and burns (5.3%), respectively.

Burns are the only childhood injury with a higher incidence in girls than boys. More than 95,000 children and teenagers die from burns each year, worldwide (7). A surveillance of home-related injuries by the Iranian Ministry of Health in rural and some urban regions demonstrated that burns (49%) and lacerations/cuts (30%) were the first two leading accidents, respectively. Also, injury rates were the highest among children, aged 0-4 years (22% of all injuries) (8).

The ALSPAC study showed that burn is not a common accident in British infants (≤ 6 months) (5). Similarly, in Canada, burn is the cause of only 5.3% of pediatric injuries, attended at emergency departments (9). This discrepancy between the current findings and other studies may be related to differences in the heating systems used in developed versus developing countries; also, the younger age of the study group in ALSPAC study may be effective. In Tehran, the incidence of hospital-admitted burns in children (< 15 years) was the highest during the first year of life (102:100,000 people per year), which was five times higher than the total incidence rate

(20:100,000). Also, in Tehran, 56% of infants' burns were scalds (10).

In the European region of World Health Organization (WHO), thermal injuries were the fourth cause of injury-related death in children (<19 years). Even in this region, the least developed countries were 38 times more affected by burns in comparison with the most developed countries; also, the scalds were the most common type of burn in children under five years of age (11).

In Czech Republic, burn was the cause of 9.3% of pediatric injuries, requiring hospitalization. Also, 31% of burn-related admissions were reported during the first year of life. In addition, 70% of burns at home occurred in the kitchen, mostly by hot water or other liquids (12).

According to WHO, falls are the leading cause of emergency department visits in children, worldwide. In fact, approximately 129 children die from falls each day. Also, about 690 children miss school or cannot perform effectively due to fatal falls (7). In USA, unintentional fall is the leading cause of injury in children (0-4 years of age) at emergency departments (1).

In England a prospective study showed that fall is the most common injury in infants (22% of total injuries) (5). Moreover, a study of injuries in infants (< 1 year of age) at emergency departments in UK showed that 61% of the accidents were caused by falling (6). Additionally, in CHIRPP study, which reported falling as the first cause of injury, fall from furniture (48.8%), being dropped (8.3%) and fall on the stairs (8.1%) were the most common types of falls, respectively (13).

In Turkey, a study on fall injuries in the first two years of life showed that 64% of young children experienced fall accidents before the second year of life; also, in 11% of cases, the infants had fallen from a height of 90-150 cm, which led to medical care visits in 6% of cases (14).

According to a report by the Iranian Ministry of Health, suffocation during food ingestion was the sixth cause of childhood death, caused by unintentional injuries in rural areas of Iran (8). However, the number of non-fatal injuries is difficult to estimate since most of them are not reported.

Suffocation, which was the fourth common injury in our study, was not one of the five leading non-fatal injuries among infants, treated at the emergency departments of USA (15). In California, foreign body injuries were the fourth cause of injury-related hospitalization in children (\leq 3 years), and foreign

body aspiration (mostly gastrointestinal) exceeded airway obstruction. Non-food airway foreign body peaked at the same age as non-airway foreign body, 9 to 11 months (13).

The main limitation of this study was its duration, which covered only half of the year. At the beginning of the study, we gathered the history of pediatric injuries (since birth), which was published as an article in Farsi language. Although the mentioned article was retrospective and the children were younger in comparison to the current study, it could demonstrate the year-round pattern of pediatric injuries in Mashhad. According to the mentioned study, the four leading injuries in the first 14 months of life in Mashhad were falling (24%), choking (22.9%), cuts (21.3%) and burns (19.5%), respectively (16).

We can conclude that injury prevention strategies for infants in cold seasons need to focus on making the home environment safer by considering heaters, hot drinks, falling points and sharp objects.

Conflicts of interest

We declare no conflicts of interest.

Acknowledgment: This study was supported by Mashhad University of Medical Sciences and approved by Ethical committee of Mashhad University of Medical Sciences.

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