

Children's falls from heights in Ahwaz, Iran

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ABSTRACT

Objectives: To describe the epidemiology of children's falls in Ahwaz, Iran and to suggest its possible causes and preventive measures.

Methods: A one-year study was carried out in Ahwaz, Iran in 1999. All children aged 0-15 years who were taken to the accident and emergency (A&E) departments of all urban hospitals because of a vertical fall from heights were investigated. All parents of children were interviewed by using a questionnaire that included demographic and fall characteristic information.

Results: During the year of study, 2403 fall injuries were admitted to A&E departments, comprising 10.1% of all children's injuries. There were 64.5% boys and 35.5% girls.

Patients ranged in age from 5 months to 15 years (mean 5.9 years), and were distributed equally between Fars and Arabs. The most frequent falls originated from windows and roofs (32.6%), from stairs (24.6%), and from playground equipment (9.3%). Many fall injuries took place at or near the home (77.5%), and involved the head (71.7%).

Conclusion: A combination of targeted information and safety regulations could be an essential effort for reducing the incidence of children's falls from heights. This requires educating the parents to the hazards of falls and to mandate safer housing.

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Children's falls from heights in urban areas are a common cause of emergency visits, and hospital admissions.¹ Falls occur at all ages and stages of childhood accounting for 10-15% of all childhood injury causes.^{2,3} It is estimated that at least half of all domestic accidents to young children involve falls.⁴ Falls are the leading cause of nonfatal injuries in some countries.⁵ In Iran, falls are the fourth cause of death of all childhood injuries at 10.2%.⁶ Children fall from buildings, ladders, trees, playground equipment or other heights. It is evident that the causes and patterns of injury and preventive measures required are different in communities.^{4,7} This study was undertaken to identify the epidemiology and patterns of children's falls in Ahwaz, Iran to suggest its possible causes and preventive measures.

Methods. All children taken to all accident and emergency (A&E) departments in Ahwaz, Iran, as a

result of fall injury, from 21 March 1999 to 20 March 2000 (21 March is the first day of the year in the Persian calendar) were recorded. The total child population in the city was approximately 300,000. Parents of injured children were interviewed and a questionnaire was completed by trained hospital general practitioners. It took approximately 10 minutes per person to complete. In this study an accidental injury was defined as a sudden external occurrence leading to a personal fall injury which required attendance to an A&E department for medical treatment. The injury must not be more than one day old at the first visit to the emergency room. Data was collected on each patient's age, sex, deprivation, the date, time and place of fall, activity surrounding the fall, the body part injured, type of injury, and eventual outcomes. In this study falls on level ground were excluded. The analyses were performed using Statistical Package for Social Sciences for Windows (version 10.0).

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Table 1 - Patients characteristics.

Characteristics	N	%
Age group (year)		
<1	245	10.6
1-4	958	41.4
5-9	850	36.8
10-15	259	11.2
Sex		
Male	1550	64.5
Female	853	35.5
Mother's marital status		
Married	2312	96.2
Divorced/Widow	91	3.8
Mother's Education		
Educated	1384	65.5
Uneducated	730	34.5
Mother's occupation		
Housewife	2115	94.5
Others	122	5.5
Total number reported is less than total patient number due to incomplete reporting		

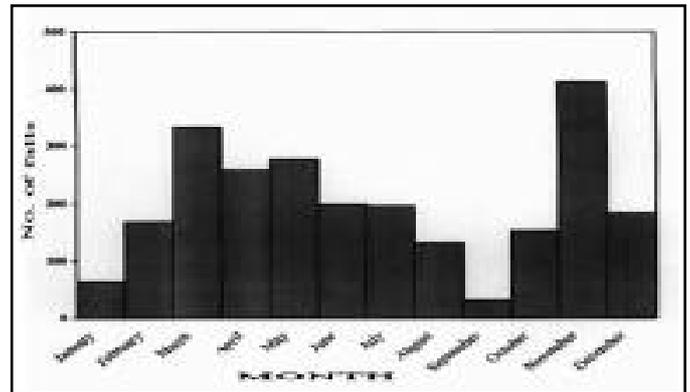


Figure 1 - Seasonal distribution of falls.

Table 2 - Distribution of injured children according to fall sites, the body part injured, type of injury and activity surrounding the fall by age group and

Variable	Preschool age group (%)	School age group (%)	Girls (%)	Boys (%)	N	Total (%)
Fall sites						
Stairs	100	-	33.1	66.9	411	24.6
Windows	37.6	62.4	50	50	272	16.3
Roof	33.5	66.5	16.9	83.1	272	16.3
Playground equipment	28.4	71.6	28.4	71.6	215	12.9
Wall	86	14	20.3	79.7	153	9.2
Household furniture	89.1	10.9	89.1	10.9	137	8.2
Bike	60	40	40	60	75	4.5
Hug/Cribs	100	-	100	-	45	2.7
Ladder	100	-	-	100	31	1.9
Tree	-	100	-	100	30	1.8
Others	100	-	100	-	31	1.9
The body part injured						
Head	60.3	39.7	37.4	62.6	1385	71.1
Hand	38.8	61.2	33.7	66.3	273	14.1
Leg	59	41	50	50	183	9.5
Back	100	-	67.4	32.6	46	2.4
Others	-	100	66.7	33.3	45	2.3
Type of injury						
Abrasion/Graze	55	45	37.3	62.7	1080	55.9
Fracture	50.1	49.9	37.5	62.5	365	18.9
Cut/laceration	73.7	26.3	17.4	82.6	228	11.8
Bruise/contusion	54	46	46.5	53.5	198	10.3
Dislocated	50	50	50	50	30	1.6
Others	50	50	-	100	30	1.6
Type of activity						
Playing/Sport	82.6	17.4	38.6	61.4	1383	64.5
Walking/Running	74.5	25.5	17.5	72.5	593	27.7
General moving	60	40	20	80	75	3.5
Resting/Sleeping	100	-	100	-	30	1.4
Others	100	-	-	100	32	1.5
Total falls n (%)	1356 (58.7)	956 (41.3)	637 (38.1)	1035 (61.9)	2403	(100)
Total number reported is less than total patient number due to incomplete reporting						

Results. During the investigation period, 2403 children were admitted to A&E departments after falling from a height comprising 10.1% of all children's injuries. Patients were distributed equally between Fars and Arabs. All parents of injured children participated to the study. There were a total of 1550 boys and 853 girls with a 1.8:1 male to female ratio. The distribution of gender was the same in all age groups. The ages of children ranged from 5 months to 15 years (mean age 5.9 years). The majority of their mothers were housewives (94.5%) and were living as a couple (96.2%). **Table 1** shows more details of patients' characteristics. **Table 2** shows distribution of injured children according to fall sites, the body part injured, type of injury and activity surrounding the fall by age group and sex. Boys and preschool children were more likely to attend A&E departments because of an injury following a fall from height than school children and girls. Of all children with a fall injury, fall from stairs, roofs, and windows were the most common causes of injury both among girls and boys. Head was the most common anatomical site of injury (77.1%) and abrasion/graze was the most common injury (55.9%). Many children were injured during playing or sporting activities (64.5%). According to parents' reports, most of fall injuries took place at or near the home (77.5%). Approximately 90% of fall injuries occurred between 8:00 a.m. to 21:00 p.m. However, preschool children were more likely to be injured because a fall within the morning hours (54.0% versus 22.3%). For example 68% falls of preschool children occurred between 9:30 a.m. to 16:30 p.m. compared to 68% falls for school children between 13:00 to 21:00 p.m. School children were more likely to be injured from June to October (school holidays) than preschool children (33.7% versus 13.6%). Time and date of injuries were distributed equally between boys and girls. **Figure 1** shows the seasonal distribution of falls.

Discussion. In this study, the fall injuries estimated approximately 10% of childhood injuries. The incidence rate of fall injuries from heights was not determined in this study. However, more than 2,400 children attended A&E with a fall injury within one year and in a city with approximately 300,000 children population, this seems to be quite high. This finding, reinforced by another study on childhood deaths from unintentional injuries in rural areas of Iran, shows that falls are the fourth cause of deaths of all childhood injuries at 10.2%.⁶ The results of this study are similar to those previously published in that most of the children were male, preschool age, and involved in a play activity at the time of the fall.^{3,7} These differences may be because of variations of children's risk perception⁸ or their risky activities.⁹ Play is closely linked to exploratory behaviors and learning and is a necessary part of socialization.¹⁰ However, most accidents occur in children in deprived areas who are playing unsupervised

near their home. It is suggested that "there is an urgent need to provide safe and stimulating play areas close to home in overcrowded and deprived areas".¹¹

In concordance with previous studies,³ children falling from stairs and windows were generally younger than those who fell from roofs, playground equipment and walls. The seasonal distribution of falls in this study is different from the American^{12,13} or European^{2,14-16} findings. For example, in England falls occur all year round but twice as many occur in the summer months.⁴ This might be because of different weather conditions in our region with very high temperatures (sometimes more than 50 centigrade above zero) during the summer months. Previous studies³ show that falls occur most frequently around meal times (11:00 a.m. to 2:00 p.m.) and 4:00 p.m. to 8:00 p.m. They have not clustered their finding to the age group of children. The results of this study show for younger children falls occur most frequently around the lunchtime and for school-age children happen after the school hours. For preschool children it may be that during these times the supervising parent is inadequate by meal preparation and less attentive, and for older ones happens because of more exposure to outdoor risks.

Most falls in this study resulted in minor injuries. Eight deaths occurred, and head injuries were the most common, occurring in approximately two-thirds of children. Many studies have indicated the importance of head injuries in children falling from a height,⁵ and head injuries most likely accounted for the deaths in our series.

This study showed that falls from buildings, windows, roofs and balconies pose a significant hazard for children and that this is not limited to urban areas. The establishment of building code regulations for safety devices on these height sites and to mandate safer housing and playground equipment to protect these children from fall injuries and education programs for both parents and children are necessary.

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References

1. Krug E. Injury - a leading cause of the global burden of disease. Geneva: World Health Organization; 1999.
2. Rozycki GS, Maull KI. Injuries sustained by falls. *Arch Emerg Med* 1991; 8: 245-252.
3. Lehman D, Schonfeld N. Falls from heights: a problem not just in the Northeast. *Pediatrics* 1993; 92: 121-124.
4. Avery J, Jackson R. Children and their accidents. London (UK): Arnold Edward; 1993.
5. Meller JL, Shermeta DW. Falls in urban children. A problem revisited. *Am J Dis Child* 1987; 141: 1271-1275.
6. Soori H, Naghavi M. Childhood deaths from unintentional injuries in rural areas of Iran. *Inj Prev* 1998; 4: 222-224.
7. Mueller F, Blyth C. Epidemiology of sports injuries in children. *Clin Sports Med* 1982; 3: 343-352.

8. Soori H. Children's risk perception and parents' views on level of risk that children attach to outdoor activities. *Saudi Med J* 2000; 21: 455-460.
9. Soori H. Children's risky activities and parents' ideas on children's risk-taking behaviour. *Medical Journal of Iran* 1999; 13: 19-26.
10. Wilson M, Baker S, Teret S, Shock S, Garbarino J. Saving children. A guide to injury prevention. New York (NY): Oxford University Press; 1991.
11. Sharples PM, Eyre JA. Children with head injuries. *BMJ* 1991; 302: 351-352.
12. Musemeche CA, Barthel M, Cosentino C, Reynolds M. Pediatric falls from heights. *J Trauma* 1991; 31: 1347-1349.
13. Rivara FP, Thompson RS, Thompson DC, Calonge N. Injuries to children and adolescents: impact on physical health. *Pediatrics* 1991; 88: 783-788.
14. Walsh S, Jarvis S, Towner E, Aynsley-Green A. Annual incidence of unintentional injury among 54,000 children. *Inj Prev* 1996; 2: 16-20.
15. Garrettson LK, Gallagher SS. Falls in children and youth. Study of falls by the three injury prevention demonstration projects. *Pediatr Clin North Am* 1985; 32: 153-161.
16. Mosenthal AC, Livingston DH, Elcavage J, Merritt S, Stucker S. Falls: epidemiology and strategies for prevention. *J Trauma* 1995; 38: 753-756.