

Unintentional injuries in children at pediatric emergency center: A developing country perspective

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ABSTRACT

Background: Unintentional injuries are important cause for childhood mortality and long-term morbidity. Developing countries accounts for majority of the childhood deaths due to unintentional injuries. **Methods:** This was a retrospective descriptive study done at a tertiary care center. Data were obtained from the records of patients. **Result:** A total of 180 children presented to pediatric emergency during the study period with male-to-female ratio of 2.1:1. The injuries were more common in 1-5-year age group. The most common mechanism of injuries were fall (49.4%) and hit by object (11.1%). Most of the injuries occurred at home. Median duration of arrival to hospital was 60 minutes. Out of 180 children, 19 (10.5%) required hospital admission. Injuries over the head and face were significantly associated with hospital admissions (adjusted odds ratio: 6.45, 95% confidence interval: 1.96-21.93, $p=0.002$). **Conclusion:** Pediatric injuries are common in India. Male children are at higher risk. Injuries over the head and face are associated with higher rates of hospitalization in children.

Key words: Children, Unintentional injury, Hospitalization

Injuries are one of the major contributors for childhood mortality and long-term morbidity. Injuries and violence account for approximately one million deaths in children and young people under the age of 18 years throughout the world [1]. Out of these, 90% of deaths are due to unintentional injuries which include road traffic accidents (RTA), fall, drowning, poisonings, and burns. Low- and middle-income countries are harboring major burden of this morbidity and mortality including India [2]. As per one report, unintentional injuries account for 3% of under-five childhood deaths in India and this figure might represent only tip of the iceberg [3]. Government is running various programs for the prevention of childhood mortality and morbidity due to diseases such as diarrhea, pneumonia, and other vaccine-preventable diseases. However, there is still lack of any specific program toward the prevention of childhood unintentional injuries which is also responsible for significant childhood mortality and long-term morbidity. This is because of lack of figures on injury-related outcomes. The objective of this paper is to present data on pediatric unintentional injuries from a tertiary care pediatric center.

METHODS

This was a retrospective descriptive study done at a tertiary care hospital at New Delhi. The objective was to determine the frequency and nature of unintentional injuries in children

<18 years attending pediatric emergency at a tertiary care hospital in North India. Data were obtained from the records of children who visited emergency in September 2011-October 2011. Unintentional injuries were defined as injuries occurred due to RTA, falls, burns, animal bites, and drowning whereas injuries due to self-harm, interpersonal violence, homicide, and suicide were counted as intentional. Any history and examination from the records suggestive of child abuse were not included in the study. Any record missing vital information was also excluded from the study.

The following information from the patient record were noted. (1) Injury timings - time when injury was sustained and time of reporting in the emergency. (2) Site of injury - body parts which were injured. (3) Injury type and mechanism - all injuries were categorized into trauma, burns, animal bites, drowning, and poisoning. Trauma included RTA, hit by an object, injury due to fall, crush injuries, or entrapment injuries. Burn injuries were included if injury to the skin or organic tissue due to contact with heat, cold, radiation, chemicals, or electricity. (4) Disposition - the following categories were made in disposition. (a) Discharged - if he/she was sent home after appropriate treatment and did not require either admission to same hospital or other, (b) admission - if child required immediate admission for further management in our hospital, (c) left against medical advice - when parents did not follow the treatment advised and took the child from the hospital, (d) expired/died - if child succumbed to injuries immediately or

during hospitalization, (e) absconded - if child went from the hospital without informing to the treating staff. To improve the quality, data collection from all the records of the children who attended the emergency during the study period was carefully explored. Any child who presented with injury was categorized for intentional versus unintentional injury by two different examiners.

Statistical analysis was done using IBM SPSS Version 21. Frequency and proportions were used to summarize data. For comparison of mean scores of the above-mentioned parameters, students' independent test was used. To find the association between two characteristics, Chi-square test was used and whenever a cell frequency was <5, Fisher's exact test was used. Univariate logistic

regression analysis was used initially to explore the association between hospital admission and various demographic and clinical factors such as age, sex, type of injury, head injury, where one risk factor was entered at a time. Then, we adjusted these factors for each other by entering in multivariate logistic regression, and adjusted odds ratios (OR) with their confidence interval (CI) are presented.

RESULTS

During the study period, 1180 children attended the pediatric emergency, and out of these, 180 (15.2%) presented with unintentional injury. During this period, no case of intentional

Table 1: Characteristics of children with unintentional injuries

Variables	n (%)					Total
	<1	1-5	6-10	11-15	>16	
Age groups (years)						
Sex						
Male	6 (60)	57 (64)	29 (63)	26 (86.7)	5	123 (68.3)
Female	4 (40)	32 (36)	17 (37)	4 (13.3)	0	57 (31.6)
Total	10 (5.5)	89 (49.4)	46 (25.6)	30 (16.7)	5 (2.7)	180
Time of arrival to emergency						
12 am-6 am	2 (20)	8 (9.2)	2 (4.3)	3 (10.0)	0	15 (8.4)
6 am-12 pm	1 (10)	10 (11.5)	7 (15.2)	4 (13.3)	0	22 (12.3)
12 pm-6 pm	3 (30)	31 (35.6)	13 (28.3)	8 (26.7)	3 (60)	58 (32.2)
6 pm-12 am	4 (4)	38 (43.7)	24 (52.2)	15 (50)	2 (40)	83 (46.6)
Total	10 (5.6)	87 (48.9)	46 (25.8)	30 (16.8)	5 (2.8)	178^
Type of injury						
Trauma	6 (60)	77 (88.5)	42 (91.3)	29 (96.7)	5	159 (89.3)
Burn	2 (20)	6 (6.9)	1 (2.2)	0	0	9 (5.0)
Dog bite	2 (20)	4 (4.60)	3 (6.5)	1 (3.3)	0	10 (5.6)
Total	10 (5.6)	87 (48.9)	46 (25.8)	30 (16.8)	5 (2.8)	178*
Area of injury						
Head	4 (40)	16 (18.4)	10 (22.2)	3 (10)	0	33 (18.6)
Face	0	36 (41.4)	10 (22.2)	7 (23.3)	1 (20)	54 (30.5)
Eye	0	0	3 (6.7)	4 (13.3)	1 (20)	8 (4.5)
Upper limb	3 (30)	25 (28.70)	14 (31.1)	11 (36.6)	2 (40)	55 (31.0)
Lower limb	2 (20)	9 (10.3)	8 (17.8)	5 (16.7)	1 (20)	25 (14.1)
Chest	1 (10)	1 (1.1)	0	0	0	2 (1.1)
Total	10 (5.6)	87 (49.1)	45 (25.4)	30 (16.9)	5 (2.8)	177#
Mechanism of trauma						
RTA	1 (16)	4 (5)	1 (2.1)	1 (3.3)	1 (20)	8 (5)
Fall	2 (33)	43 (55.8)	26 (62)	13 (44.8)	3 (60)	87 (54.7)
Hit by object	2 (33)	8 (10)	7 (16.6)	2 (6.9)	0	19 (11.9)
Crushing	1 (16)	4 (5)	2 (4.7)	3 (10.3)	0	10 (6.2)
Miscellaneous	0 (0)	18 (23.3)	6 (14.2)	10 (34.4)	1 (20)	35 (22)
Total	6 (3.8)	77 (48.4)	42 (26.4)	29 (18.2)	5 (3)	159@
Outcome						
Discharged	7 (70)	76 (85.3)	38 (82.6)	26 (86.6)	4 (80)	151 (83.8)
Admission	2 (20)	10 (11.2)	4 (8.6)	2 (6.6)	1 (20)	19 (10.5)
LAMA/absconded	1 (10)	3 (3.37)	4 (8.6)	2 (6.6)	0	10 (5.5)
Total	10 (5.5)	89 (49.4)	46 (25.6)	30 (16.7)	5 (2.7)	180

NB: Reasons for total number of children < 180 in the last column ^2 children time of arrival was missing. *2 children came with unknown poisoning, #children had injuries other than mention parts, @children with trauma only included. RTA: Road traffic accidents

injury was encountered. In this subgroup, male-to-female ratio was 2.1:1. The mean age of the children presenting with injuries was 5.7 ± 4.4 years. There were three main types of injuries in our cohort - trauma (89.3%), burns (5%), and bites (5%). Fall from the height (49.4%) was the most common mechanism in children who presented with history of trauma. About 50% of the injuries were sustained over the head and face region. Median duration of arrival to hospital after injury was 60 minutes (interquartile range 30-120). Nineteen children (10.5%) with injuries were admitted for further management, and one child succumbed due to severe head injury after admission. Other variables are depicted in Table 1.

We have done bivariate analysis to find variables associated with hospitalization. We found that injury overhead (including face) was significantly associated with hospital admission (adjusted OR: 6.45, 95% CI: 1.96-21.93, $p=0.002$); however, age of the child, time of arrival in emergency, and injury types were not significantly associated with hospital admission (Table 2).

DISCUSSION

Based on the intent of injuries, injuries can be divided into intentional and unintentional. Intentional injuries include child abuse and violence against children whereas unintentional injuries include falls, RTA, drowning, poisoning, and burns. In developed countries, injuries are the most common cause of childhood morbidity and mortality. As per the World Health Organization report, injuries are the 6th leading cause of childhood mortality throughout the world; however, in India, it is the 5th leading cause of under-five childhood mortality [4]. In the last three decades, there is debate over using word “injuries” versus accident because accident literally means to unpredictable and unavoidable events whereas injury events can be studied and understood therefore preventable.

Childhood is vulnerable age group which is prone to injuries, especially male children due to their inherent nature of exploration. In our study, 15.2% of the children presented to emergency with unintentional injuries with male-to-female ratio of 2.1:1, and most of them were between 1 and 5 years of age. Data from sample registry system registry also had comparable results [5]. We also looked at the time of arrival of children with injuries to emergency and noted that 50% of the patients arrived between 6 pm and 12 am. According to the global child unintentional injury survey, a larger proportion of the children presented in the day time [6]. This difference could be because, in our cohort, most of these injuries occurred at home and in the evening.

We also observed that head and face were the most common body areas to be injured (46.6%), and this can be explained as head and face contributes to the larger proportion of body surface area in children. The most common mechanism of injuries was falls (54.7%), and most common place of injury occurrence was at home which was analogous to different studies from India, Singapore and other multicenter studies [4,7,8]. The absence of bed railings, unprotected roofs, and improper placement of

Table 2: Logistic regression for hospitalization of children with unintentional injuries

Variables	OR (adjusted)	CI		p
		Lower	Upper	
Head injury				
Yes	6.45	1.96	21.93	0.002
No	Referent			
Age of the child (year)				
<1	0.66	0.11	3.82	0.652
>1	Referent			
Time of arrival to emergency				
6 pm-6 am	1.33	0.26	6.62	0.722
6 am-6 pm	Referent			
Injury type				
Trauma	2.05	0.49	8.54	0.322
No trauma	Referent			

When OR (adjusted) was calculated for one risk factor, other 3 were adjusted for the same. OR: Odds ratio, CI: Confidence interval

agriculture tools and pesticides, especially in rural settings, was found to be underlying reason for the same in other studies though we were unable to do such survey in our study [7]. In our setup, it was a common observation that during festival seasons such as Makar Sankranti and Holi, the incidence of falls from roof increases because of unsupervised kite flying, and similarly in Diwali, the incidence of burns increases significantly because of fire crackers (personal observation).

A child who succumbed to death in our study sustained severe head injury due to fall from unrailed roof. In our study, 10% of children required admission for the management of injuries (13 children with head injury, 3 with polytrauma, and 3 with burn). We found that injuries over the head and face were significantly associated with hospital admission. As mentioned above, injuries are different from accidents which are preventable. Haddon's matrix gives insights for the prevention of injuries [9]. This can be done by understanding host, agent, and environmental factors. Developed nations have understood these factors and implemented various policies to reduce the injuries and injury-related morbidity and mortality, but this is still not practical for developing nations including India. This is mainly due to lack of data registry for childhood injuries; as a result, many such events including fatal and non-fatal go unreported.

Limitation of the study was small sample size and retrospective data collection. Educating the parents about the unsafe environment at home and enlightening them how home can be safer for their children might reduce unintentional injuries to larger extent. Pediatric injury data registry is required in India to understand the childhood injuries in depth.

CONCLUSION

Pediatric injuries are common in India. Male children are at high risk for unintentional injuries. Children with injury over the head

and face required hospitalization often than children with injuries over other body parts.

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