

Original Article

Injury pattern in children: a population-based study

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Abstract:

Background: Injuries, as a cause of mortality, morbidity and disability are relatively more important in the first half of the individual's lifespan, and especially so in childhood and adolescence. The burden of child injuries in India is not clearly known, as injury information has not received much importance. This survey was an attempt to describe patterns of injuries among children.

Design: Community based cross-sectional study. Setting: Rural and urban registered areas under department of community medicine, JNMC, Aligarh.

Methods: A standard questionnaire was administered to guardians of 91 of these children to elicit information on the etiology of the injury, demographic and socioeconomic details.

Results: Study results revealed that children aged 6-15 years (19%) suffered more injury than children under 5 years age group (14%). Under five year old children were found to be more prone to fall (32.4%) and struck/hit by person or object (32.4%) as compared to children aged 6-15 years. Injuries due to fire/flames or heat (8.8%) were found to be more in children in under 5 years age group as compared to other group. The most common sites affected in under five children were head, face and neck (35.3%) and lower limb (35.3%) with equal frequency followed by upper extremity (30%). Furthermore, 89.8% of study subject had minor severity of injuries.

Conclusions: To prevent injury successful prevention strategies should include multifaceted approaches.

Introduction:

Injuries, as a cause of mortality, morbidity and disability are relatively more important in the first half of the individual's lifespan, and especially so in childhood and adolescence. India is home to nearly 500 million young people among whom children less than 14 years are 35.3% (364 million)¹. Since India's independence, a large burden of communicable, infectious and nutritional disorders is gradually on the decline due to massive efforts and investments by successive political efforts, even though it is an unfinished agenda. Parallel to these changes, it is also becoming apparent that children saved from diseases of the past are becoming victims of injury on road, recreational places, at home and in public. As per WHO estimates, nearly 950,000 children die in the world due to an injury each year². The burden of child injuries in India is not clearly known, as injury information has not received much importance. National Crime Records Bureau data and few independent studies reveal that nearly 15 - 20 % of injury deaths occur among children³. As per NCRB report of 2006, there were 22,766

deaths (<14 years) due to injuries among children⁴. However, a recent national review on burden of injuries in India revealed that, nearly 8.2% of deaths and 20-25% of hospitalizations occur among children, based on few hospital and population based studies³. For every death, nearly 30 to 40 children are hospitalized and are discharged with varying level of disabilities. The average global prevalence of moderate and severe disability ranges from 5% in children aged 0-14 years to 15% in adults aged 15-59 years, and 46% in adults aged 60 years and older⁵. Childhood injuries remain a major source of concern for parents because they not only affect children but also contribute to significant emotional and financial burdens on the parents. This survey was an attempt to describe patterns of injuries among children. The outcome from injuries is significant since it occurs in the younger age, thereby affecting long-term growth and development of children. Children with disabilities after an injury lead life with persistent disabilities for the rest of their. As injury burden, pattern, determinants and outcome varies from region to region,

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it is essential to understand these characteristics to formulate effective child safety policies and programmes.

Material & Methods:

Study design

This study reports result of a community-based, cross-sectional descriptive study conducted from August 2006 to July 2007, in the field practice areas of the Department of Community Medicine, Jawaharlal Nehru medical college Aligarh Muslim University, Aligarh.

Sampling technique&Data collection

For an anticipated prevalence rate of injuries (19%), allowing for a maximum error of 2%, a total of 282 households was selected⁶. The Survey used two stage stratified random sampling. In the first stage the strata were population registered with urban and rural health training centre, followed by further stratification of those original two strata into four substrata. Then, the sampling unit (household) was selected within each stratum by random sampling. Although the unit of sampling was a household, the unit of analysis was a child aged less than 15 years⁷. A six month recall period was used in this study in order to include as many injuries as possible.

After obtaining an informed consent, parents of children were screened for eligibility and were interviewed with a pre-tested questionnaire. The questionnaire was pre-tested in both English and Hindi before it was administered. An injury was included in the study when it was serious enough to meet any of the following conditions by a child: need for any kind of medical care; need to stay in bed at least one day; or need to stop regular work or activity for at least one day after injury during the preceding six months. The child's parents were asked to explain the pattern of the injury. Disability was defined as loss of at least one day of work/school due to the direct effect of an injury sustained within the six-month period preceding the study. A major injury was one that led to at least 30 days lost and a minor injury less than 30 days⁸.

Statistical Analysis

The data so collected was tabulated and analyzed. Simple descriptive statistics& frequencies were used.

Ethical approval and informed consent

Ethical approval for the study was granted by the Ethics Committee of the Department of Community Medicine, J.N.Medicalcollege, AMU; and the local authorities. For

minors (children), verbal informed consent was obtained from the parents/guardians. Appropriate rapport was established with parents before administering the questionnaire.

Profile and Pattern

The age of the person and gender are important determinant of injury. Injuries, as a cause of mortality and disability are important in the first half of the individual's lifespan, and especially so in childhood and adolescence. Data were gathered on 824 children with a prevalence rate of 11%.

Injury as per age & gender

On comparing the frequency of injury with age, it was found that children aged 6-15 years (19%) suffered more injury than children under 5 years age group (14%). Boys (65%) werereported to have more domestic accidents as compared to girls(35%), because of their inquisitive and risk taking behavior.

As shown in table-1, when place of injury was considered, it was observed that under 5 & 6-15 year age-group suffered comparatively more domestic accidents than accidents during outdoor activities. Observed frequency of domestic accident was 79.4 % in under5 and 82.5% in 6-15 years aged, respectively.

Place of Injury

Table-1: Age distribution bythe place of injury

Place of Injury	Age group(Yrs.)				Total	
	<5		6-15			
	No	%	No	%	No	%
Room	13	38.2%	19	33.3%	32	35.2%
Kitchen	1	2.9%	-	-	1	0.2%
Bathroom	3	8.8%	5	8.9%	8	8.8%
Courtyard	10	29.4%	23	40.3%	33	36.3%
Outside	7	20.7%	10	17.5%	17	19.5%
Total	34	100%	57	100%	91	100%

Mechanism of Injury

The majority of injuries in under 5 years were caused due to fall (32.4%) and struck/hit by person or object (32.4%). Most common mechanism of injury in 6-15 years age group was found to be stab/ cut (31.6%) and struck/hit by person or object (29.8%). As shown in table-2, children aged under 5 years (14.7%) were less

likely to sustain stab/cut injuries as compared to age group of 6-15 years (31.6%). Under five children were found to be more prone to fall (32.4%) and fire/ flames or heat (8.8%) as compared to older age group.

Table-2: Distribution of mechanism of injuries by age

		Age group(Yrs.)				Total	
		<5		6-15			
		No	%	No	%	No	%
Mechanism of injury	Traffic	4	11.7%	6	10.5%	10	11.0%
	Fall	11	32.4%	13	22.8%	24	26.4%
	Stab /cut	5	14.7%	18	31.6%	23	25.2%
	Struck/Hit by person or object	11	32.4%	17	29.8%	28	30.8%
	Fire/Flames or Heat	3	8.8%	1	1.8%	4	4.4%
	Animal bite	-	-	2	3.5%	2	2.2%
	Electric shock	-	-	-	-	-	-
	Others/Unknown	-	-	-	-	-	-
Total		34	100%	57	100%	91	100%

Site of Injury

Table-3 shows the distribution of injuries according to anatomic site of the body. In accordance to WHO⁶, the affected body parts were distributed as, head and neck, face, chest, abdomen, upper extremity and lower extremity. The most common primary body parts affected by injury were lower limbs 39.6% followed by head, face and neck 31.9%, and least to chest and

abdomen 1.2%. Table depicts that under five years of aged children were equally prone to injury to lower extremity (35.3%) and head, face & neck injuries (35.3%). In the present study, as observed, the frequency of injury to lower extremity (42.1%) in 6-15 years age group is much more than other anatomic sites.

Table-3: Distribution of site-specific injury by age

Site of injury		Age group(Yrs.)				Total	
		<5		6-15			
		No	%	No	%	No	%
	Head, Face and Neck	12	35.3%	17	29.8%	29	31.9%
	Chest and abdomen	-	-	1	1.8%	1	1.2%
Upper Extremity	10	29.4%	15	26.3%	25	27.3%	
Lower Extremity	12	35.3%	24	42.1%	36	39.6%	
Total		34	100%	57	100%	91	100%

Physical nature of injury

As shown in table-4, no considerable variation has been noticed in both age groups when nature of injury was taken into account. Altogether bruise/ superficial injuries (39.3%) & cut-bite or open wound injuries (35.3%) were more inflicted in the study subjects. The most frequent nature specific injuries observed in children under 5 and

older children 6-15 years age group were cut-bite or open wound (31.9% & 37.2% respectively) followed by bruise/ superficial injuries (43.2% & 37.2% respectively). Moreover, burn injuries were observed comparatively higher in younger age groups (6.7% in <5 & 1.3% in 6-15 years age group).

Table-4: Distribution of nature specific injury by age

Nature of injury		Age group(Yrs.)				Total	
		<5		6-15			
		No	%	No	%	No	%
	Fracture	2	4.5%	5	6.4%	7	5.8%
	Sprain/Strain/ Dislocation	1	2.3%	6	7.6%	7	5.8%
	Cut, Bite, Open wound	14	31.9%	29	37.2%	43	35.3%
	Bruise/Superficial injury	19	43.2%	29	37.2%	48	39.3%
	Burn	3	6.7%	1	1.3%	4	3.2%
	Concussion/Head injury	4	9.1%	7	9%	11	9%
	Internal injury and others	1	2.3%	1	1.3%	2	1.6%
*Total		44	100%	78	100%	122	100%

*Figure differ as nature of injury was multiple in a single injury event

Severity of injury and disability

Table-5: Distribution of severity specific injuries by age

Severity of Injury		Age group(Yrs.)		Total	
		<5	6-15	Total	Percentage
	Major (> 30 disability days)	3	7	10	10.2%
	Minor (< 30 disability days)	35	53	88	89.8%
*Total		38	60	98	100%

*Figure differ as few subjects had more than one episode of injury with varied severity of injury

Table-5 depicts the distribution of injuries among the age groups according to severity. During the recall period in the study, most of the children's length of disability remained less than 30 days, as it was noticed that 89.8% of study subject had minor severity of injuries.

Discussion:

A fair involvement of children can be explained based on their inquisitiveness and adventurousness. High risk environments such as lack of proper play facilities also contribute significantly to the increase susceptibility to

injuries. Increased mobility, playing on terrace or flying kites and falls from trees were common factors that were found to be associated with children increased risk of injuries as observed in a study of unintentional injuries in the South Plains/Panhandle region of Texas⁹. Age is an important risk factor for many injuries but its influence varies between specific injury groups, especially in children. Our findings on the distribution of injuries among both the groups of study subjects showed that children aged 6-15 years (19%) suffered more injury than children under 5 years age group (14%). Older children are at high risk because of their natural curiosity, their mode of reaction, their impulsiveness and their lack of experience in the calculation of risk. As the recreational, outdoor activities increase with age, so does the frequency of injuries. Similar result was observed by identical population based studies¹⁰⁻¹³, stating that children between the age of 6-12 years were the most commonly affected with injuries.

On the contrary to our result, few studies found that the young children were found to be most vulnerable to injuries¹⁴⁻¹⁶. Mittal et. al in his study observed that injury rates were highest among children aged 0-4 years.

In this study, boys (65%) met with more domestic accidents as compared to girls (35%). Much of the existing evidence suggested the boys were at a greater risk of being injured than girls. Similar observation was made in a survey of domestic childhood accidental injuries (1998) conducted in a rural general practice area in Arau, Perlis, reported that male children were the most commonly affected with a male to female ratio of 1.7:1¹⁰. Otters H (2005), Hang H M et al. (2003), Maziak W et al. (2006), and Petridou et al. (2005) all also reported that among children the incidence of injuries was higher among boys than girls¹⁷⁻²⁰. Behavioural differences, such as increased risk taking and the influence of peer pressure on the behavior of young males may explain the higher observed rates of injury amongst boys than girls.

A significant risk factor for injury turned out to be the place of residence. Observed frequencies of domestic accident were 79.4 % in under 5 and 82.5% in 6-15 years aged, respectively. Our study results showed that the majority of injuries in under 5 years were caused due to fall (32.4%) and struck/hit by person or object (32.4%). Most common mechanism of injury in 6-15 years age group was found to be stab/ cut (31.6%) and struck/hit by person or object (29.8%). Similar

observation was made by other studies, reporting that the commonest place of injury was home and the most frequent mechanisms of injury were falls and cuts/bruises followed by other modes. In a survey done in Pakistan, the majority of injuries occur at home (85%), with just 10% due to road traffic, and falls were the most common type of injury (60%) followed by cuts/bruises (21%) and burns (14%)¹². In another study done in Pakistan, Lasi Set al. (2010) revealed that 61% of the injuries took place inside the home and the most common non-fatal injuries were found to be falls (10.5 fall injuries per 100 person (child)-years of exposure), burns and scalds (3.5 burn injuries per 100 person (child)-years of exposure), and road traffic injuries (RTIs) (2 RTIs per 100 person (child)-years of exposure)²¹. A study on pattern of injury in domestic injuries reported that there were 145(54%) cases with fall from height, 52 (19%) children fell at the same level or slipped while walking/running, 15(6%) reported burn injuries, unintentional cuts with sharp domestic utensils were noted in 19 (6%), submersion history was given by 20 (7%) parents, poisoning was noted in 7(3%) cases, firearms and cracker injuries were noted in 3(1%) children, Insect/animal bites were reported by 11(4%) cases²².

Similarly in another study conducted in Pakistan, Siddiqui E et al (2012) it was observed that their results were in concordance with our results. The annual incidence of various types of injuries was: fall 28.7 [95% CI 19.5, 37.9], cuts/bruises 9.7 [95% CI 5.3, 14.1] and burns 6.6 [95% CI 3.0, 10.2] per 1000 per year. Falls were the most common type of injury (60%) followed by cuts/bruises (21%) and burns (14%)¹². In contrast to our study, Ahmed A. Arif et al. (2003) reported that the majority of the injuries occurred while the child was engaged in sports or other related recreational activity than indoor activities⁹. Road traffic crashes were observed to be the most common causal factor, responsible for 324 injuries (26.5%) in children in a hospital based study²³.

Our study results showed that the most common primary body part affected by injury was lower limb 39.6% followed by head, face and neck 31.9%; and least to chest and abdomen 1.2%. However, a number of under 5 children suffered from head injuries, probable reason may be due to a higher frequency of injuries due to fall in the study. An increased susceptibility to head and face injuries in children has also been reported by Ahmed A. Arif et al. (2003) who observed that younger children

were more likely to receive head/face/neck injuries, whereas older children were more likely to receive lower extremity injuries⁹.

Bruises (39%) along with cut-bite and open wound (35%) contributed significantly among children under this study. Similar results were observed in a population-based survey with a high frequency of skin injuries. Study reported that 29.5% of all injuries involve skin injuries (for example, lacerations and cuts) and sprains and strains account for 15% of all injuries¹⁷. In contrast to our results, a population based study on the pattern of injury in children stated that the most common injuries were dislocations & sprains followed by open wounds & superficial injuries and contusions¹¹. Similarly, Ahmed A. Arif et al. (2003) observed that younger children were more likely to receive injuries due to sprain/strain/torn ligament (22.4%), cut/laceration (18.0%), broken bone/fracture (15.8%), and bruise/contusion (9.2%)⁹. Whereas, Hang H M et al. (2003) reported that the children aged 0–14 had the highest incidence rate of scalds¹⁸.

Considering number of days lost due to injuries, our study reported a fewer number of children with a major injury (10.2%), as most of the children reported to have trivial injuries. Correspondingly, another study revealed that approximately 43% of respondents reported that the injury restricted their child's activity for seven or more days and approximately 21% reported restricted activity for more than two weeks⁹.

Conclusion:

It is evident from the current study that childhood injuries are a hazard to children's health and wellbeing. In spite of the size of this burden and the known potential for prevention, the need of international attention to injuries in terms of both policies and resource investments in public health is lacking. Successful prevention strategies often include multifaceted approaches such as education, incentives for safe human behavior, legislation/enforcement, and environmental changes. Home safety programs for the children to reduce falls; playground safety measures; child safety and seat procurement programs; violence prevention initiatives that raise awareness of violence and abuse and media campaigns that raise awareness and educate people especially care givers about ways to prevent injury are some examples. Therefore, there is an urgent need to integrate child injury prevention into comprehensive approach to other child health and development programmes.

Limitations

Some degree of Recall bias especially with reference to trivial injuries could not be ruled out.

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