Unintentional Injuries Among Under-five Children in a Rural Area in Delhi

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Objective: To determine the prevalence of unintentional injuries and its associated factors among under-five children in Rural Delhi. **Methods:** This community based cross-sectional study was conducted in Pooth Khurd village of Delhi during 2018 among under-five children and their care givers. Primary caregivers of the child in the randomly selected households were interviewed using a semi-structured pretested questionnaire. Data related to unintentional injuries in past 12 months and its associated factors were collected. **Results:** Unintentional injuries were prevalent in 29.3% (95% CI: 25.8-32.9) of the 650 under-five children included. Male children had 1.4 times increased prevalence of injuries (aPR=1.4, 95% CI: 1.1-1.7). As the age increases from 2 years to 5 years the prevalence of injuries increased constantly from 29% to 50%. The prevalence of unintentional injuries was significantly higher among children of working mothers (aPR=1.7, 95% CI: 1.4-2.1), family with more than 3 children (aPR=1.6, 95% CI:1.1-2.4), household without a separate kitchen (aPR=1.6, 95% CI:1.2-2.2) and household with inadequate lighting (aPR=1.8, 95% CI:1.4-2.3). **Conclusions:** The factors significantly associated with unintentional injuries were male gender, higher age of the children, maternal occupation, increased number of children in the family, not having a separate kitchen and inadequate lighting.

Keywords: *Accident, Epidemiology, Domestic injuries, Risk factors, Trauma.*

METHODS

World Health Organization has estimated that in 2017, 3% of the global under-five deaths were attributed to injuries [1-3]; with South-East Asia region contributing 31% [4]. Unintentional injuries are the sixth leading cause of under-five mortality in India [5], with 4% of the under-five deaths in India being attributed to injuries [6].

In rural India, drowning is the most common type of unintentional injuries whereas in urban India accidental falls are the most common type [7,8]. Injuries could be reduced by identifying the factors associated with unintentional injuries. Various factors associated with unintentional injuries can be classified as child-related factors like the softness of body parts, impulsiveness, experimentation, and lack of knowledge on the judgment of speed [7-9], environment-related factors like poor housing infrastructure, unsafe storage places for harmful substances, and lack of barriers to cooking/washing areas [8]. These living conditions are more common in low and middle-income countries like India. This study was conducted to determine the prevalence of unintentional injuries and its associated factors among under-five children in a rural area of Delhi.

A community-based cross-sectional study was conducted in the Pooth Khurd village of North-West district of Delhi. As per census 2011, the total population of village was 10654 among which 14.12% belong to the age group of 0-6 years. The total number of houses in the village was 2030 out of which 1350 households had children. This study was conducted over a period of 12 months from January to December, 2018 in the service area catered to this hospital.

The parents/caregivers of the under-five children who were residing in the study setting for a minimum period of 6 months were included in the study. Primary caregivers included parents, other persons who are directly responsible for the child at home. The parents/caregivers who were suffering from any debilitating illness or mental disorders were, not able to communicate in Hindi/English or who were not cooperative during the interview, were excluded from the study.

With the expected prevalence of unintentional household injuries in under-five children as 37.4%, with 10% relative precision and 95% confidence level, the

sample size was calculated to be 643 using OpenEpi, Version 3 [8]. The sample size was rounded to 650. There were 1350 households with children, out of which 650 households were selected by simple random sampling technique using computer-generated random number.

The selected households were visited by the investigator to check for the eligibility and availability of primary caregiver/parent. If the caregiver was available, participant information sheet was given after explaining the study procedure and informed written consent was obtained. If the caregiver was unavailable, two revisits to the household were made. If the caregiver was not available even with revisits, that household was excluded from the study. If there were more than one under-five children in the household, then injury details were collected for the eldest child to avoid the clustering effect of risk factors at household level. A pretested semi-structured questionnaire was used to interview the primary caregivers of under-five children. Data related to socio-demographic characteristics and details about unintentional injuries were collected.

Unintentional injury included all recallable bodily injury to the index child in the past 12 months, for which there was no evidence of predetermined intent at the time of the interview. It included road traffic accidents, falls, fires and burns, drowning, animal bites, poisonings and aspirations [1].

The variables included in the study were child's age, gender, primary caregiver's age and relation to the child, mother's and father's education and occupation, religion, family type, socio economic status, number of children in the household, presence of overcrowding, adequate lighting, separate kitchen and pets/animals in and around the households. Overcrowding was assessed using the criteria based on number of persons living per room in the household [10]. If the investigator was able to read news print in all the corners, the center of the room and also in the darkest portion of the room, then the lighting was considered adequate. The socio-economic status of the household was assessed using modified BG Prasad, 2019 classification [11].

The study was conducted after getting clearance from the Institutional Ethics Committee. Informed written consent was taken from the primary caregivers/parents. The children who were found to have injury related health issues during the visit were managed by the investigator based on the severity of the injury. Children with an injury which needed referral were referred to the nearby secondary health care center.

Statistical analysis: Data were entered using EpiData

software version 3.1 (EpiData Association Odense) and analysis was done using STATA statistical software version 14 (StataCorp LCC). Association between various risk factors and unintentional injuries were analysed using univariate logistic regression models. Multivariate analysis was done using generalized linear models (GLM) with Poisson distribution and adjusted prevalence ratio was calculated. The independent variables which were significantly associated with unintentional injuries ($P<0.05$) were included in the model.

RESULTS

In total, the 650 under-five children were included in the study. The median (IQR) age of the children was 25 (10-40) months and 363 (56%) of the children were boys. Mother was the primary caregiver in 90% of the children and 87% of the primary care givers were in the age group 21-40 years. Sixty four percent of the mothers were educated above primary level (76.3% fathers) and only

Table I Socio-demographic Characteristics of Under-five Children With Unintentional Injuries (*N*=650)

Characteristics	No. (%)	Children injured (n=191)
Male	363 (55.8)	120 (33.1)
Age of child (mo)		
<12	200 (30.8)	17 (8.5)
13-24	115 (17.7)	34 (29.6)
25-36	131 (20.2)	48 (36.6)
37-48	98 (15.2)	39 (39.8)
49-60	106 (16.3)	52 (49.1)
Age of primary caregiver (y)		
<20	20 (3.1)	8 (40.0)
21-40	576 (88.6)	163 (28.3)
41-60	50 (7.7)	17 (34.0)
>60	4 (0.6)	2 (50.0)
Nuclear family	569 (87.5)	174 (30.6)
SES		
Class 5	339 (52.2)	110 (32.5)
Class 4	206 (31.7)	50 (24.3)
Class 3	70 (10.8)	15 (21.4)
Class 2	30 (4.6)	11 (36.7)
Class 1	5 (0.8)	4 (80.0)
Number of children		
1-2	490 (75.4)	115 (23.5)
3-4	137 (21.1)	60 (43.8)
5 and above	23 (3.5)	15 (65.2)

SES: socioeconomic status classified based on modified BG Prasad scale, 2019.

16.6% of the mothers and 99.4% father were working. Eighty-four percent of the families belonged to socio-economic classes 4 and 5. Unintentional injuries occurred in 191 (29.3%) under-five children (95% CI: 25.8-32.9) (**Table I**). Seventy eight percent of the study participants were living in pucca house. Overcrowding was present in 31.6 percent of the households and adequate lighting was absent in 32% of the households. Separate kitchen was there in 59.7% of the households and pets were there in 54% of the households.

The results of univariate and multivariate analysis for the factors associated with unintentional injuries are given in **Table II**. Prevalence rate of unintentional injuries were higher in male children (aPR=1.4 95%CI: 1.1-1.7), children older than 12 month [aPR=3.0 (95% CI:1.8-4.9) for 2- year-old children; aPR=4.5 (95% CI:2.8-7.2) for 4-year-old children], and children of working mothers (aPR=1.7, 95% CI:1.4-2.1).

Among household-level characteristics, not having separate kitchen (aPR=1.6, 95% CI:1.2-2.2) and inadequate lighting (aPR=1.8, 95% CI:1.4-2.3) were significantly associated with unintentional injuries.

DISCUSSION

The prevalence of unintentional injuries was lower at 29.3% in our study compared to Indian studies [7,8,12]. This difference might be due to the differences in the study setting since the socio-demographic characteristics are widely variable in these regions. The operational definition for unintentional injuries and the duration of its assessment were also different in these studies which might have contributed to the difference in results.

Our study has found that male children are having 1.4 times higher prevalence injuries which is similar to the results from other studies and reports from all over the world [7,8,12,13]. This might be because of the socialization processes, which lead male children to engage in risky behavior than females, differences in aggressiveness, personality and infant care. The current study found that as the age of the child increases, the chance of getting injured increases. These results are also consistent with other studies [7,12]. As the age increases the child becomes more active and more ambulatory which increases the risk of getting injured. Our study found that children of working mothers had 1.7 times higher prevalence of injuries which is similar to other studies [8,12,13]. Lack of time and ability to implement injury prevention practices among working mothers might be the reason [14]. Among the household level risk factors, the prevalence rate of injuries were significantly higher among children living in households without

Table II   Socio-demographic Characteristics Associated With Unintentional Injuries Among Under-five Children in a Rural Area, Delhi (*N*=650)

Characteristics	Adjusted PR (95% CI)	P value
Male gender	1.4 (1.1-1.7)	0.004
Age of children, mo		
<12	1	-
13-24	3.0 (1.8-4.9)	<0.01
25-36	3.5 (2.1-5.6)	<0.01
37-48	3.7 (2.3-6.1)	<0.01
49-60	4.5 (2.8-7.2)	<0.01
Education of mother below primary level	1.0 (0.7-1.4)	0.95
Working mother	1.7 (1.4-2.1)	<0.01
Education of father below primary level	1.0 (0.8-1.4)	0.76
Nuclear family	1.3 (0.8-2.2)	0.27
Socioeconomic status		
Class 5	0.7 (0.4-1.2)	0.17
Class 4	0.9 (0.6-1.1.6)	0.84
Class 3	1	–
Class 2	1.6 (0.8-3.1)	0.17
Class 1	2.0 (0.9-4.2)	0.06
Number of children in the family		
1-2	1	–
3-4	1.5 (1.1-1.9)	0.002
5 and more	1.6 (1.1-2.4)	0.008
Overcrowding	1.1 (0.7-1.7)	0.69
Kutcha or semi-pucca house	1.1 (0.8-1.3)	0.61
No separate kitchen	1.6 (1.2-2.2)	0.002
Inadequate lighting	1.8 (1.4-2.3)	<0.01
Pets/animals in or around house	1.2 (0.9-1.6)	0.08

PR-prevalence ratio

separate kitchen which is similar to another Indian study [15]. In Indian setting, kitchen is the place where most of the hazardous materials are kept. The absence of a separate kitchen exposes the children to these hazardous materials and increases the risk of injury.

A well-known risk factor, children's risk-taking behavior was not assessed in the study. However other socio-demographic characteristics and household level risk factors were assessed. Our study considered the occurrence of injuries in the past 12 months which might involve recall bias, which could not be avoided. The temporality of the association cannot be inferred since it is a cross-sectional study. However, few socio-demo-

graphic risk factors did not change with time for which temporal association can be inferred.

A relatively large sample size and representative sampling technique increased the study's external validity. Standard definitions were used for the exposure and outcome variables which increased the internal validity of the study.

Almost one-third of the under-five children in this rural area had unintentional injuries in the past one year. Community-based interventions need to be done emphasizing the improvement of house type, overcrowding, lighting and having separate kitchen in the household. Injury prevention education may address care giver and household related factors to some extent. Studies from other settings may provide more comprehensive information for interventions at a national level for injury prevention in children.

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