

Injury and its associated factors among residents of an urban slum during the festival month in South India: A community-based survey

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ABSTRACT

Introduction: Injury morbidity and mortality have been steadily increasing in both developed and developing countries including India. The current study tried to assess the incidence of injury and identify the risk factors associated with injuries during the festival month in a selected urban area in Puducherry. **Methods:** It is a community-based cross-sectional survey conducted among the residents in the urban field practice area of a medical college in Puducherry. Participants were interviewed using a pretested questionnaire. Information on the incidence of injury and its associated factors were collected. Data were entered in EpiData and analyzed using Stata. Generalized linear models with Poisson distribution were used to identify the risk factors associated with the injuries. **Results:** Overall, 1380 participants from two selected clusters were interviewed. The incidence rate of injuries was 5.2% (95% CI: 4.0–6.4). In adjusted analysis male (RR 1.96, 95% CI: 1.15–3.37) and student (RR 2.91, 95% CI: 1.13–7.54) were independently associated with having an injury. Most of the injuries were unintentional and accidental. **Conclusion:** The reported incidence of at least one injury was 52 per 1000 population per month and the majority were accidental in nature. It was higher during the festival week. Public health strategies at the primary healthcare level targeting adult males and school children will be effective in the reduction and prevention of injury.

Keywords: Accidents, festivals, injuries, urban slums, wounds

Introduction

Injury is broadly defined as the occurrence of “body damage due to sudden transfer of energy (physical, mechanical, chemical, thermal or radiant), resulting from an interaction

of agent, host and environment and beyond the physiological tolerance of an individual.” It can also result due to sudden deprivation of an essential requirement like oxygen as in the case of drowning.^[1] Injuries are a major public health problem worldwide and have been increasing steeply in developing and developed countries. Someone in the world dies once every six seconds due to the consequences of any injury and globally more than 5 million people die every year as a result of injuries. Nine percent of the world’s deaths is due to injury and it gives rise to nearly 1.7 times the number of fatalities that

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could happen due to combined deaths of tuberculosis, HIV/AIDS, and malaria.^[2]

In India, the National Crime Record Bureau (NCRB) reported that every year approximately one million people die due to injury-related causes, which accounts for 10–15% of total deaths, and 20 million are hospitalized.^[3,4] India's contribution to the global number of injuries and death is increasing, and if the estimated trends continue to increase, none of the states in India would meet the target of Sustainable Development Goals even in 2030.^[5] As the NCRB report depends on police records which mainly capture fatal injuries of medicolegal importance, minor nonmedicolegal injuries go unnoticed. Total and comprehensive data on injuries due to all causes covering deaths, hospitalizations, and disabilities are not available from any single agency. Moreover, various reports and studies have divulged the gross underreporting of nonfatal injuries.^[5-7] Hence, the true burden of injuries can be measured through community-based surveys and establishments of injury registries across the country that helps to develop preventive public health strategies. Hence, the present study was carried out with the objectives to estimate the incidence of injury during the festival month to describe injuries in terms of intent, cause, nature, place of injury, and to identify the risk factors associated with having an injury among residents of an urban slum in Puducherry.

Materials and Methods

Study design and setting

A community-based cross-sectional study was carried out among the residents in the urban field practice area of JIPMER, Puducherry. The total population of the field practice area is around 9500. There are around 1750 households in the area. The Urban Health Centre provides preventive, promotive, curative, and rehabilitative services to the people.

Sample size and sampling

The sample size was calculated to be 1350, using the formula $N = (Z_{1-\alpha/2})^2 p(1-p)/d^2$, where $Z_{1-\alpha/2}$ is the value of normal deviate at 95% confidence level, p is the minimum proportion (p) of any type of injury occurring in a month as 10% based on previous study,^[8] and d is the relative precision of 20% and a design effect of 1.5 for the type of sampling adopted. Of the four wards present in the area, two wards were selected randomly. Systematic random sampling was adopted to select the households in the area into the study. All the individuals residing in the selected household for more than six months were included in the study. In case the house was locked, two more visits were made before excluding the same.

Study tool and data variables

The data was collected with the help of a structured pretested questionnaire. The questionnaire was developed by the investigators after literature review and also based on WHO injury surveillance guidelines.^[1] Initially, it was developed in English and later translated to Tamil which was the vernacular language of study participants. Tamil version of the questionnaire

was back-translated to English in order to ensure the accuracy of the questions. Face and content validity was ensured and pilot testing of the questionnaire was done and necessary modifications were made. The study tool collected information on detailed sociodemographic variables, the occurrence of injury, the causes, nature, and place of injuries, the details regarding the medical care services availed, and the place of treatment. The Center for Disease Control and Prevention (CDC) classification was used to define the type of injuries.^[9]

Data collection procedure

Medical interns and postgraduates posted in the urban health center of the Department of Community Medicine were involved in data collection for one month. The data collectors were trained to administer the questionnaire to the subjects in order to minimize loss of information and error. They were oriented on ethical principles like confidentiality of information, the privacy of participants and their rights, and informed consent. The primary respondents were homemakers (women) as their awareness of the health-related issues of the whole family members were better than anyone else of the family. Informed verbal consent was obtained from the homemakers of selected households and then the questionnaire was administered at their residence. The participants were asked to recall if they had any injuries during the festival month, i.e., three weeks prior and a week after the festival period, irrespective of its severity. The data collection period was from October 13 to November 11 during the study year, which ensured a one month recall period.

Data entry and analysis

Data were entered in EpiData (version 3.1, EpiData Association, Odense, Denmark) and analyzed using Stata version 12.0. The incidence of injuries was calculated and reported with a 95% confidence interval (CI). Bivariate analysis was carried out to find out the unadjusted association between the injury status and various independent variables and then adjusted multivariate analysis was carried out using Generalized Linear Models with Poisson distribution and log link function adjusting for clustering at the household level. Those study variables that had a P value of < 0.10 in the bivariate model were included for the multivariate Generalized Linear Models to assess the independent effect of the study variable on injury status. The findings with a P value of < 0.05 were considered as statistically significant.

Results

There were 1380 study participants included from 351 households from the two randomly selected wards in the urban field practice area. Among them 720 (52.2%) were females. There were 668 (48.4%) people who were in the age group of 18 to 44 years, 408 (29.6%) of less than 18 years, 204 (14.8%) in the 45–59 years age group, and the rest 100 (7.2%) were aged 60 years and above. Of the study participants, 1311 (95%) were Hindus, 61 (4.4%) were Christians, and 8 (0.6%) were Muslims. Other sociodemographic details of the study participants are depicted in Table 1.

At least one event of injury during the one month was reported by 72 participants. The monthly incidence rate was 52 per 1000 population (95% CI: 40–64). Of the total 72 injuries, the majority were accidental 70 (97.2%), one was homicidal, and another one was suicidal injury. Of these 72 persons who sustained injuries, the major causes of injury were fall (34.8%) followed by burns (26.4%). There were 15 (20.8%) individuals who had encountered road traffic injury (RTI), two (2.7%) had dog bite, another two (2.7%) were assaulted, and nine (12.6%) had injuries due to other causes. Pertaining to places of injury, 48.6% of the injuries happened at home and 36.1% were RTIs. Few injuries were reported from schools (4.2%) and workplace (6.9%). The nature of injury was abrasion and/or bruise (40.3%), burns (26.5%), and cut injuries (19.4%). Fracture of bones and sprains were reported from 8.3% and 5.5% of injuries, respectively. Among those who sustained injury, 58 (80.5%) had received first aid at the site of injury and 45 (62.5%) of them received treatment from either a doctor or healthcare facility. Of those who received treatment, all were treated as outpatients. The majority of the injured (86.6%) availed treatment services from the public sector [Table 2].

The distribution of injuries during the study period is shown in Figure 1. There was a peak in the occurrence of injuries from the last week of October to the first week of November 2013, which corresponds to the local festival “Deepavali” period. In addition to cracker-related burn injuries, other causes of injuries were also high during the festival period as reflected by the graph.

In unadjusted analysis, males (RR 2.3; 95% CI: 1.4–3.8), employed urban slum residents (RR 2.7; 95% CI: 1.1–6.3), and students (RR 4.3; 95% CI: 1.8–10.4) were significantly associated with incidents of injury. The association of various other sociodemographic variables with injury status is shown in Table 1. Gender and occupation were considered for multivariate analysis after adjusting for clustering at the household level. On adjusted analysis, being male (RR 1.96, 95% CI: 1.15–3.37) and being a student (RR 2.91, 95% CI: 1.13–7.54) were independently associated with having an injury.

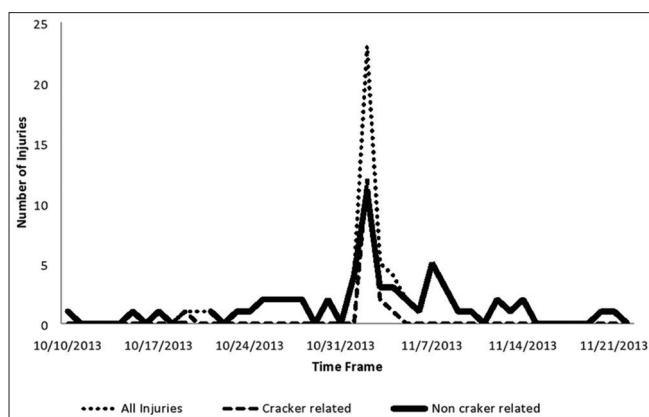


Figure 1: Distribution of injuries during the study period

Discussion

Our study revealed that the monthly incidence of injuries among the urban slum residents of Puducherry during the festival month was 52 per 1000 population, (95% CI: 40–64). There was an increase in the number of injuries one week before the festival. Both cracker-related and noncracker-related injuries increased during the festival season. Almost all injuries were accidental by intention. Nearly, one-third of the injuries were caused by fall and burns. About half of the injuries occurred in and around the home premises. Abrasions and/or bruises were the most common nature of injuries. Being male and being a student were independently associated with the increased risk of sustaining an injury.

Community-based cross-sectional studies conducted in urban and semi-urban areas of India show that the one-year prevalence of injuries range from 10 to 21%^[10-14] and in rural areas it ranged from 9 to 25%.^[15-18] The occurrence of injuries in the present study is higher than that reported in the urban and rural parts of India. The major reason could be the difference in the recall period, the operational definitions used, the age group studied, the difference in awareness and practice related to the

Table 1: Description of intent, cause, nature, and place of injuries, and the details of treatment taken of the injured (n=72)

Characteristics	Frequency (%)
Intent of injury	
Accidental	70 (97.2)
Homicidal	1 (1.4)
Suicidal	1 (1.4)
Cause of injury	
Fall	25 (34.8)
Burns	19 (26.4)
RTA	15 (20.8)
Others	9 (12.6)
Assault	2 (2.7)
Dog bite	2 (2.7)
Place of injury	
Home	35 (48.6)
Roads	26 (36.1)
Work Place	5 (6.9)
School	3 (4.2)
Others	3 (4.2)
Nature of injury	
Abrasion/bruise	29 (40.3)
Burns	19 (26.5)
Open (cuts/bites/laceration)	14 (19.4)
Fracture	6 (8.3)
Sprain	4 (5.5)
Treatment details	
Received first-aid	58 (80.5)
Received treatment	45 (62.5)
Place of treatment (n=45)	
Public sector	39 (86.6)
Private sector	6 (13.3)

Table 2: Association of sociodemographic variables with injury status among the study subjects (n=1380)

Characteristics	Total, n=1380	Injured n=72	Unadjusted RR (95% CI)	P
Age in years				
<18	408	32 (7.8)	2.3 (1.0-5.1)	0.043
18-44	668	28 (4.2)	1.2 (0.5-2.8)	0.630
45-59	204	7 (3.4)	1	-
≥60	100	5 (5)	1.5 (0.5-4.5)	0.511
Gender				
Male	660	49 (7.4)	2.3 (1.4-3.8)	0.001*
Female	720	23 (3.2)	1	-
Religion				
Hindu	1311	70 (5.3)	1.6 (0.4-6.0)	0.489
Christian	61	2 (3.3)	1	-
Muslim	8	0	NA	NA
Education				
NA (<6 years)	103	4 (3.9)	1.0 (0.3-3.3)	0.987
Illiterate	195	7 (3.6)	0.9 (0.3-2.5)	0.895
1-8 th standard	456	37 (8.1)	2.1 (0.9-4.5)	0.064
9-12 th standard	444	17 (3.8)	1.0 (0.4-2.3)	0.992
Graduates	182	7 (3.8)	1	-
Occupation				
Unemployed	189	10 (5.3)	2.6 (1.0-7.3)	0.055
Employed	622	33 (5.3)	2.7 (1.1-6.3)	0.025*
Home maker	301	6 (2)	1	-
Students	268	23 (8.6)	4.3 (1.8-10.4)	0.001*
Socioeconomic status				
Class-I	132	10 (7.6)	2.2 (0.9-5.5)	0.097
Class-II	205	7 (3.4)	1	-
Class-III	313	18 (5.8)	1.7 (0.7-3.8)	0.232
Class-IV	459	24 (5.4)	1.5 (0.7-3.3)	0.312
Class-V	271	13 (4.8)	1.4 (0.6-3.2)	0.460
Ward				
I	608	33 (5.4)	1.1 (0.7-1.6)	0.754
II	772	39 (5.1)	1	-

RR-Relative risk, CI-Confidence interval, *Statistically significant ($P<0.05$), NA-Not applicable

sociocultural aspects, and the intentions of the injuries captured. However, the incidence of injuries in the current study was relatively high compared to previous national and international studies mentioned, the most likely reason for this difference could be due to the fact that the study was conducted during the local festival, i.e., “Deepavali.” Deepavali is a festival when people burst crackers and thus accidental burn injuries are expected to increase.

Almost all injuries were accidental and unintentional in our study and it remained the same as that of previous similar studies conducted in India.^[11-15] The most common cause of injury in our study was falls and studies conducted in rural and urban Pondicherry,^[13,16] rural Tamil Nadu,^[17] urban Karnataka,^[10] and rural Wardha district of Maharashtra^[18] also reported the same. An RTI accounted for one-fifth of the reported injuries in our study, and in previous studies, it ranged from 15.1 to 25.4%.^[5,7,16,18] Individuals aged less than 18 years (7.8%) were found to be commonly injured in the current study, whereas studies from other parts of India reported that most of the injuries occurred among the middle-age group individuals.^[16,18] Males had sustained

injury two times higher than females in our study and previously reported studies also mention that males were at a higher risk for injuries.^[13,16,18-20]

There was a common perception that there will be an increase in the injuries during the festival period and this increase is mainly due to cracker-related injuries. We calculated the incidence of cracker- and noncracker-related injuries separately during the study period. It showed that there was an increase in the incidence of injuries due to both cracker and noncracker related reasons. This shows that all types of injuries are temporally increased during the local festival. Our study provides newer information that even the falls and RTIs were more during the festival period. The increase in RTI during the festival period is quite possible as there will be increased travel of people from one place to another. The sound and the disturbance during the festival period can cause an increase in falls and RTIs, as these disturbances have a negative impact on the concentration and cautiousness of the individual.^[21] Though many government and nongovernment agencies had taken multiple efforts like legislations, amendments, prohibitive orders, and educational programmes to prevent firecracker-related injuries during the festival period, there still exists a gap in their implementation and the corrective measures taken.

Most of the injuries were unintentional and accidental in nature and happened within the household premises commonly among men and young children. There is enormous potential for primary care physicians and family physicians to take a more proactive role in contributing to the prevention and control of these domestic injuries.^[22] For injury prevention and control, they can be involved first for the development of context-specific effective information, education, and communication (IEC) interventions regarding the use of safety measures to prevent both cracker and noncracker-related injuries. Second, family physicians play a major role in improving the knowledge and practice of first-aid measures of the family and community. These services can be rendered to parents while providing reproductive and child healthcare at under-five clinics and to school children while providing school health services by the medical officer and his team. Third, the promotion of environmental modification is another important strategy for the prevention of home injury, especially among children and the elderly. Fourth, clinical interventions for primary care physicians include reducing the risk of an adverse health condition following injury, screening to identify, and treat a condition early that reduces injury-related complications and its severity and duration.

Strengths and limitations

Our study had several strengths. First, the study had a good sample size to precisely estimate the incidence of the injuries during the study period. Second, a standard proforma adapted from WHO injury surveillance was used and trained medical trainees were involved in data collection. Third, data quality was ensured using the EpiData software and best-fit models were

used to assess the factors independently associated with having an injury. However, the study had a few limitations. The reference period being only 30 days was very narrow and the estimates might have been influenced due to the festival activity during the same period. However, the interest of the study was to capture the clustering effect during the festival period and also to avoid recall bias due to a longer recall period.

Conclusion

The current study showed that there was a high incidence of the injuries during the festival month and they were related not only to crackers but also to others. Men and children were independently associated with sustaining an injury. The types of injuries reported were mostly preventable in nature. Hence, primary care physicians and family physicians play an important role in educating families and patients about their potential risk for unintentional injuries based on their age, awareness, and context-specific sociocultural factors.

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Conflicts of interest

There are no conflicts of interest.

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