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A community–based cross–sectional study of injuries and risk factors in Raipur, Chhattisgarh

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ABSTRACT

Objective: To investigate the epidemiology of injuries and risk factors in Raipur, Chhattisgarh, India.

Methods: A community-based cross-sectional study was conducted in 10 selected wards of Raipur. Data were collected from injured individuals using a structured questionnaire. Socio-demographic characteristics, injury mechanisms, medical care-seeking behavior, and outcomes were assessed.

Results: 312 individuals with injuries were included, with 193 men and 119 women. Males were more likely to be injured than females (61.86% v.s. 38.14%). Younger adults aged 21–30 were at highest risk (21.5%). The most common injuries were falls (38.8%) and road traffic accidents (34.9%). Injuries occurring on-road are the most frequent, followed by, at home with a highly significant association ($P<0.001$). Most individuals sought medical care (90.1%), primarily in private facilities (51.3%).

Conclusions: This study provides valuable insights into the epidemiology of injuries in Raipur. The findings can inform the development of evidence-based interventions to reduce the burden of injuries and improve the health and well-being of the population.

KEYWORDS: Injury epidemiology; Raipur; Road traffic accidents; Falls; Substance abuse

1. Introduction

Injuries have become a significant public health issue globally. They are the leading cause of death worldwide. According to a

WHO report, injuries and violence claim the lives of 4.4 million people each year, accounting for nearly 8% of all deaths[1]. Young people account for almost 50% of the world's injury-related mortality, representing a significant proportion of a country's economically productive workforce. Injuries and violence are responsible for an estimated 10% of all years lived with disability[2]. They also impose a substantial economic burden, costing billions yearly in healthcare, lost productivity, and law enforcement. According to the World Bank, India accounts for almost 11% of the world's accident-related deaths[3]. In 2022,

Significance

Injuries continue to be a major public health. The present study listed the common injuries in Raipur city, which included falls and road traffic accidents; males were at greater risk; younger adults were the most common victims to suffer from these injuries. The proposed interventions to decrease the burden of injury in the city of Raipur are public awareness about the prevention of falls and safe road behaviors, reduction of substance abuse, and improvement of safety measures at home and on the roads.

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approximately 5.83 thousand individuals died in road accidents in Chhattisgarh[4]. Chhattisgarh ranks 14th in the country for the number of fatal accidents, over-speeding of vehicles was the main reason for road accident casualties[5].

The increasing industrialization and use of vehicles, along with a growing population in crowded and unsafe areas, as well as limited access to affordable emergency health services, all contribute to a higher health burden of injuries in developing regions worldwide[6]. In the past, injuries were often overlooked in research, with people assuming that they were arbitrary and uncontrollable acts. However, in developed nations, epidemiologists have expanded their studies from focusing solely on diseases to also include injuries, which has helped to understand the scope and impact of injuries, leading to the development of safety precautions, laws, and regulations to prevent them[7]. Unfortunately, in developing nations like India, there has been relatively little focus on injury awareness, prevention, and control. Few community-based epidemiological studies have been conducted on injuries, and obtaining data on non-fatal injuries is quite challenging. Recognizing the importance of understanding injuries, there is a need to conduct a study to assess the multifaceted nature of injuries to reduce their risks in the community. Given the significant impact of injuries in one's life, be it fatal or non-fatal injury, or its effect on socioeconomic factors, this study aims to investigate epidemiological connections between risk factors, events, and injury outcomes in Raipur of Chhattisgarh.

2. Patients and methods

2.1. Study setting

The study was a community-based cross-sectional observational study conducted in 10 selected wards of Raipur, Chhattisgarh, from November 2020 to November 2022, with data collection occurring between January 2022 and June 2022. The study population comprised individuals who experienced injury or death due to injury within the past year in selected households of Raipur.

2.2. Ethical consideration

The study is approved by the Ethics Committee of Pt. JNM Medical College Raipur, Chhattisgarh, vide letter no. MC/Ethics/2021/169. Informed verbal consent was obtained from study subjects, and confidentiality of participant information was maintained.

2.3. Sample size

The estimated sample size was 310 injuries, calculated based on WHO (2004) data on injury prevalence (41.2 per 1000 population), using the following formula,

$$n = \frac{Z_{1-\alpha/2}^2 (1 - P)}{\epsilon^2 \times P}$$

Wards were selected using simple random sampling, the population proportion to size method was used to select injured study subjects, and the EPI-random walk technique for household selection.

2.4. Inclusion & exclusion criteria

All the households that had resided at the same address for at least one year and study subjects with injuries within the past year who were willing to participate were included in the study. Exclusion criteria encompassed households closed households during the door-to-door survey, mentally ill respondents, and non-cooperative individuals. The study flowchart is shown in Figure 1.

2.5. Data collecting

Data collection was performed using a predesigned, semi-structured questionnaire that gathered socio-demographic profiles of households and study participants, as well as information about the epidemiology of injuries. The data collection method involved a door-to-door survey and interviews.

2.6. Statistical analysis

Descriptive statistics (frequency, percentage) and the *Chi-square* test was used for analysis, with a *P* value of less than 0.05 considered statistically significant.

3. Results

The study included 312 participants, with the age distribution as follows: 17.6% were aged 1-10 years, 15.7% were 11-20 years, 21.5% were 21-30 years, 15.7% were 31-40 years, 14.1% were 41-50 years, and 15.4% were over 50 years old. The median (Q1, Q3) for age is 28 (16, 43). The sex distribution showed 61.86% males and 38.14% females. Regarding education, 11.2% were illiterate, 67.9% had education up to the 10th standard, 11.9% had higher secondary education, and 9.0% had graduated or above. In terms of occupation, 8.97% were unemployed, 26.92% were students, 9.93% were homemakers/housewives, 23.71% were daily

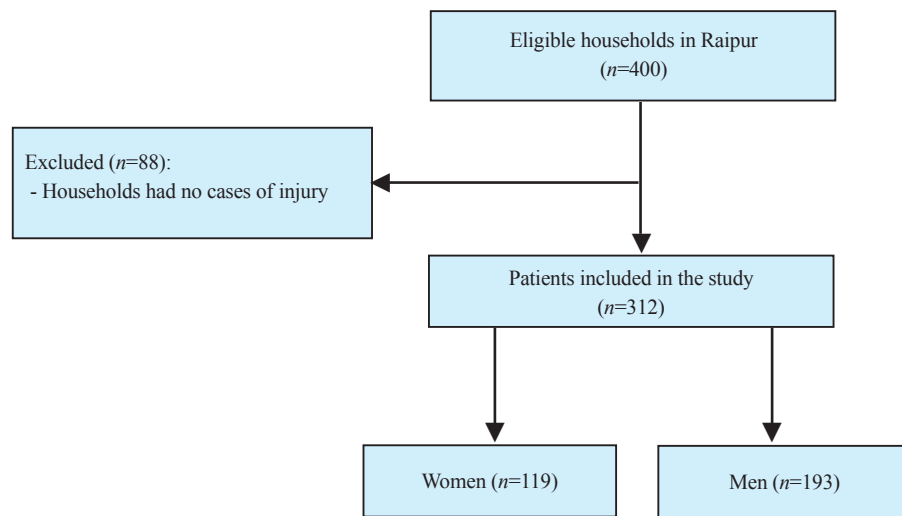


Figure 1. The study flowchart.

Table 1. Association of socio-demographic variables with injury.

Parameters	Women (n=119)		Men (n=193)		χ^2	P
	n	%	n	%		
Education						
No education	32	26.9	24	12.4	28.242	0.001
Primary	31	26.1	50	25.9		
Middle and high	46	38.7	101	52.3		
Graduation and above	10	8.4	18	9.3		
Occupation						
Student	33	27.7	54	28.0	70.563	<0.001
Job (government or private)	17	14.3	62	32.1		
Other	69	58.0	77	39.9		
Marital status						
Married	57	47.9	100	51.8	22.787	<0.001
Unmarried	47	39.5	91	47.2		
Widow/divorced	15	12.6	2	1.0		
Nature of injury						
Bruise	15	12.6	24	12.4	14.749	0.098
Burn	17	14.3	10	5.2		
Contusion	8	6.7	13	6.7		
Cut, bite, open wound	31	26.1	63	32.6		
Fracture	20	16.8	34	17.6		
Head injury	10	8.4	22	11.4		
Organ's system injury	2	1.7	10	5.2		
Other (hanging)	0	0.0	1	0.5		
Other-sole injury	0	0.0	1	0.5		
Sprain/strain	16	13.4	15	7.8		
Intention of injury						
Intentional	3	2.5	4	2.1	0.068	0.795
Unintentional	116	97.5	189	97.9		
Mechanism of injury						
Assault	2	1.7	5	2.6	29.247	0.015
Burn	13	10.9	9	4.7		
Dog bite	3	2.5	14	7.3		
Fall	57	47.9	64	33.2		
Traffic injury	30	25.2	79	40.9		
Others (animal bite, suicide, poisoning)	14	11.8	22	11.4		
Place of injury						
Home	72	60.5	53	27.5	34.856	<0.001
Workplace or school	13	10.9	48	24.9		
On road	34	28.6	92	47.7		

Table 1. Continued.

Parameters	Women (n=119)		Men (n=193)		χ^2	P
	n	%	n	%		
Time of injury						
Morning	37	31.1	46	23.8	5.804	0.122
Afternoon	27	22.7	60	31.1		
Evening	37	31.1	47	24.4		
Night	18	15.1	40	20.7		
Day of injury						
Weekday	51	42.9	109	56.5	13.74	0.001
Weekend	18	15.1	41	21.2		
Do not know	50	42.0	43	22.3		
Substance abuse present	1	0.8	40	20.7	25.501	<0.001
Medical care taken after injury	98	82.4	183	94.8	14.793	0.001
Hospitalization days						
0 to 3	84	70.6	160	82.9	22.408	0.033
≥4	9	7.6	16	8.3		
NA	26	21.8	17	8.8		
Type of facility						
Government	18	15.1	35	18.1	15.425	0.009
Private	52	43.7	108	56.0		
Self	41	34.5	31	16.1		
Other	8	6.7	19	9.8		
Cost of the treatment (in INR)						
0 to 500	70	58.8	84	43.5	11.048	0.087
501 to 1000	22	18.5	36	18.7		
1001 to 10000	14	11.8	40	20.7		
>10000	13	10.9	33	17.1		
Injury severity						
Minor	73	61.3	97	50.3	7.069	0.070
Moderate	39	32.8	71	36.8		
Severe	7	5.9	25	13.0		
Outcome						
Recovered	118	99.2	184	95.3	17.091	0.002
Death or referred	1	0.8	9	4.7		

INR: Indian National Rupees.

workers, 21.79% were in private jobs, 1.60% were government employees, 2.24% were retired, and 4.80% were preschool children. Socioeconomic status, based on the Modified B.G. Prasad's scale 2021, was distributed as follows: 5.12% in the upper class, 23.39% in the upper middle class, 41.66% in the middle class, 25.96% in the lower middle class, and 3.84% in the lower class.

The association of socio-demographic variables with injury among the study subjects reveals several significant patterns. Education levels show a notable association with injury, with the highest number of injuries occurring among those with middle and high school education, followed by those with primary education. The chi-square test indicates a significant association between education level and injury ($P=0.001$). Occupation also shows a strong association with injury, with students and those in other occupations like daily wage workers being the most affected. Substance abuse is present in 41 cases, showing a significant association with injury ($P<0.001$). Mechanism of injury shows significant associations, particularly with falls and traffic injuries (with a P value of 0.015). Injuries occurring on-road are the most frequent, followed by, at

home with a highly significant association ($P<0.001$). The day of injury shows a significant association, with more injuries occurring on weekdays compared to weekends ($P=0.001$).

Medical care was taken after injury in 281 cases, with a significant association ($P=0.001$). Hospitalization days show a significant association, with most injuries requiring 0 to 3 days of hospitalization ($P=0.033$). The type of facility used for treatment shows a significant association, with private facilities being the most utilized ($P=0.009$). The cost of treatment does not show a significant association ($P=0.087$), with most treatments costing between 0 to 500 international normalized ratio. The outcome of injuries shows a significant association, with most individuals recovering ($P=0.002$).

4. Discussion

The present study, conducted in Raipur, aimed to explore the association between injuries and socio-demographic factors. A total of 312 injured cases were included, with a male predominance of

61.86%. Significant associations were found between the level of education and occupation with the occurrence of injuries. The mechanism and place of injury were also significant, with most injuries occurring at home, particularly due to falls. Injuries occurring outside the home were mainly due to road traffic accidents. Substance abuse was notably associated with injuries. It was observed that most injuries occurred on weekdays rather than weekends. Following an injury, patients required an average of up to three days of hospitalization. Additionally, most patients preferred private facilities for their treatment.

In the present study, the maximum number of injured patients was from the younger age group (21 to 30 years). This study finding is consistent with Verma who found a similar peak for injuries in the 15-25 age group in Delhi, India[8]. Another study also found a high incidence of injury among 15-44-year-olds[9]. These findings suggest that young adults are particularly vulnerable to injuries in India. In our study, a maximum of the participants were male who experienced an injury. Studies by Verma *et al.* also had similar findings where male predominance was noted for injuries[8,9]. In the study, substance abuse was also found to be significantly associated with the injury. This finding was like the many studies published so far[10,11]. This can be attributed to the risk-taking behavior in young males and consuming intoxicating substances.

In the present study, the main cause of injury was either a fall or a road traffic accident. The finding is consistent with the reports of the National Crime Report Bureau, as a study issued by Lancet states that the predominance of injury in India is due to road traffic accidents with 17.2 deaths per 100 000 population[12]. An interesting finding in our study was that the injury on weekdays occurs more frequently as compared to the weekends. It can be linked with workplace injury and the pressure to reach the workplace on time. This finding is like a study conducted by Tiruneh *et al.* where they found that the injuries occur more on weekdays[13]. This finding is in contrast when compared to the study which found that injuries on weekends (55%) occur more compared to weekends[14].

Participants preferred to visit a private facility over a public facility for the treatment of injury. A similar finding was observed by Rout *et al.*, who found that the utilization of public facilities was very low for both in and outpatient services[15]. It can be attributed to the quick response in the private facility as compared to the public facilities. In the present study, most of the patients who had injuries recovered and resulted in a positive outlook without death or disability.

However, this study also has its limitation. It included community-based in all the zones of Raipur. However, it has been done with a small sample size of 312 injured people, an increased sample size can be more representative and enhance the generalizability of the study.

To conclude, this epidemiological study of injuries in Raipur,

Chhattisgarh, provides valuable insights into the prevalence, patterns, and risk factors associated with injuries in the region. The findings highlight the need for targeted interventions to reduce the burden of injuries and improve public health.

Conflict of interest statement

The authors report no conflict of interest.

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There was no extramural funding received for conducting this study.

Data availability statement

The data supporting the findings of this study are available from the corresponding authors upon request.

Authors' contributions

Study concept and design: VKL and AC; Analysis and interpretation of data: VKL, AC, and NV; Drafting of the manuscript: VKL, AC, and NV; Critical revision of the manuscript for important intellectual content: VKL, AC, and NV; Statistical analysis: AC.

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