Original Article

Incidence and pattern of road traffic injuries in tribal population of Jharkhand: One-year study in a tertiary care teaching hospital

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Abstract

Background and Aim: Road traffic injuries (RTIs) are a leading cause of mortality and morbidity globally. This study aimed to assess the incidence and pattern of RTIs in the tribal population of Jharkhand. **Methods and Materials:** This prospective observational study was conducted for a period of 1 year (June 2018 to May 2019) at the Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. A pretested semi-structured questionnaire was administered. A total of 1713 road traffic accident (RTA) victims belonging to tribal population were interviewed during the study period. Data were entered in a Microsoft Excel sheet and analyzed using Statistical Package for Social Sciences (SPSS) version 16. **Results:** There were 1258 (73.4%) males and 455 (26.6%) females. The majority (31.4%) of patients belonged to the age group of 21–30 years, followed by 19.2% in the age group of 31–40 years. The majority (52.13%) of RTAs involved a two-wheeler vehicle. Head injury was the most common type of injury (40.86%), followed by lower limb injury (26.68%). Common upper limb injuries were in the humerus and radius and ulna region. The majority of lower limb injuries involved tibia and femur. Common thoracic-abdomen injuries were soft tissue injury and lung contusion. Drunk driving (alcohol influence) was seen in 34.68% of cases of RTI. **Conclusions:** RTA is a major public health problem which needs to accelerate the efforts of road safety preventive measures. Road safety education should be promoted.

Keywords: Head injury, injury pattern, Jharkhand, road traffic accident, the tribal population

Introduction

Road traffic injuries (RTIs) have become an important public health issue along with communicable and noncommunicable diseases worldwide.[1] Globally, RTI is the eighth leading cause of death and is projected to rise to the top five by 2030.[2] Approximately 90% of the estimated 1.3 million deaths from RTI occur in low- and middle-income countries.[3] In particular, countries in the Western Pacific region and South-East Asia Region account for more than half of all RTI-related mortalities in the world. The mortality rate in the South-East Asia region is 18.5/100000 population and one-third of those deaths involve motorized 2–3 wheelers.[4]

As per World Health Organization (WHO), every year approximately 1.35 million people die as a result of a road traffic crash, and between 20 and 50 million more people suffer nonfatal injuries. RTIs are the leading cause of death for children and young adults aged 5–29 years. It causes considerable economic

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losses to individuals, their families, and nations as a whole. Road traffic crashes cost most countries 3% of their gross domestic product.[5]

India accounts for about 10% of road accident fatalities worldwide. In 2017, deaths due to road traffic collision in India were 147,913, that is, 405 deaths each day.[6] India has one of the poorest and worst records of road safety in the world. Trauma victims, who deserve immediate attention, do not get the priority because of a lack of funds, lack of administrative focus on the problem, lack of infrastructure, initiative, and vision. Information on the injury pattern, nature, and outcome are extremely limited in India, as trauma registries and hospital-based research have not developed systematically.[7,8]

Deaths and injuries due to road traffic accidents (RTAs) are preventable. A wide range of effective road safety interventions exist and a scientific systematic approach to road safety is essential to tackle the problem. Geographical variations are different in hilly regions of eastern India (Jharkhand) and a large proportion of the tribal population resides here, where the knowledge related to road safety and road constructions is comparatively poor. RTA-related factors and patterns of injuries related to literature are sparse in this region and no such study has been undertaken in our hospital setting yet. Therefore, this study aimed to assess the incidence and pattern of RTIs in the tribal population in this geographical location.

Subjects and Methods

This prospective observational study was conducted for a period of 1 year (June 2018 to May 2019) at the Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. Prior permission from the institutional ethical committee was taken for conducting the study. For the study, an RTA was defined as an accident that took place on the road between two or more objects, one of which must be any kind of moving vehicle.[9] Any injury on the road without the involvement of a vehicle (e.g., a person slipping and falling on the road and sustaining injury) or injury involving a stationary vehicle (e.g., persons getting injured while washing or loading a vehicle) were excluded from the study.

Inclusion criteria: All the RTA patients admitted to the orthopedic department and those who gave consent participated in the study.

Exclusion criteria:
1. Cases discharged from OPD and casualty.
2. Brought dead cases.
3. Cases not willing to participate in the study.
4. Cases dying after admission before the interview.

The victims were interviewed for the injury details and the circumstances leading to accidents and the same was recorded on a predesigned and pretested proforma along with basic demographic information. Relatives/attendants were also interviewed in case the condition of the victims demanded so. The police records were also referred for collecting additional information wherever necessary for cross-checking. Information related to the pattern of RTAs with victims was measured by using day, time and place of accidents, vehicle types, type of accidents, causes of accidents, type and pattern of injury, and treatment given. Associated factors like safety measures taken and the influence of alcohol were considered. Data collected were entered into Excel sheets and statistical analysis was done using Statistical Package for Social Sciences (SPSS) software version 16. Descriptive statistics (frequency and the percentage) were applied.

Results

A total of 5422 cases of RTAs were admitted to the orthopedics department of this hospital for treatment during the period of study. Out of which 1713 cases were from the tribal population which contributes to about 31.59% of total cases of RTA. Out of which, there were 73.4% males and 26.6% females, indicating a 2.76:1 male-female ratio. The majority (31.4%) of patients belonged to the age group of 21–30 years, followed by 31–40 years (19.2%), 11–20 years (19.0%), 41–50 years (13.7%), and 51–60 years (8.9%). Only 3.1% of patients were in the age group of 0–10 years and 3.7% in the age group of 61–70 years, followed by 0.7% in 71–80 years, 0.23% in 81–90 years, and 0.06% patients were in 91–100 years of age [Table 1].

The majority (52.13%) of patients were using 2-wheeler while 35.96% of patients were pedestrians, 6.3% were using heavy vehicles, and 5.6% were using light motor vehicles [Table 2].

The most common body part involved was the head which occurred in 40.86% patients followed by lower limb in 26.68%, thoracoabdomen in 16.11%, upper limb in 13.49%, and spine in 2.86% cases [Table 3].

Among head injury patients [Table 4], the majority (12.73%) of patients had an intracerebral hemorrhage (ICH), followed by epidural hematoma (EDH) (11.32%), subdural hematoma (SDH) (9.57%), and subarachnoid hemorrhage (SAH) (7.24%).

Among thoracoabdominal injury [Table 5], 7.9% patients had soft tissue injury, 1.7% had perforation, 1.4% had a liver laceration, 0.2% had spleen laceration, 1.2% patients had bladder injury, 2.1% had lung contusion, and 1.6% of the patients had a rib injury.

Among spinal injury [Table 6], 1.3% of the patients had a thoracic injury and 1.6% had a lumbar injury. None of the patients had a cervical, sacral, or coccygeal injury.

Among upper limb injury [Table 7], the humerus was the most commonly involved bone (5.07%) followed by both radius and ulna, radius, hand, ulna, clavicle, and scapula in decreasing order. Upper limb amputation occurred in less than 1% of cases.

Table 1: Distribution of RTA victims by age and gender

Age group (Years)	Male		Female		Total	
	n	%	*n*	%	*n*	%
0-10	33	02.62	20	4.40	53	3.09
11-20	246	19.55	80	17.58	326	19.03
21-30	418	33.23	120	26.37	538	31.41
31-40	238	18.92	91	20.00	329	19.21
41-50	169	13.43	65	14.29	234	13.66
51-60	98	07.79	54	11.87	152	8.87
61-70	41	03.26	23	5.05	64	3.74
71-80	10	00.79	02	0.44	12	0.70
81-90	04	00.32	00	00	04	0.23
91-100	01	00.08	00	00	01	0.06
Total	1258	73.44	455	26.56	1713	100

Table 2: Distribution of road traffic injury cases according to road users

Road Users	No. of cases	Percentage (%)
Two Wheelers	893	52.13
Pedestrian	616	35.96
HMV	108	6.30
LMV	96	5.60
Total	1713	100

HMV=heavy motor vehicles (trucks, buses, tractors, etc); LMV=light motor vehicles (cars, jeeps, vans, etc.)

Table 3: Distribution of RTA victims by part of the body involved

Part of the body involved	*n*	%
Head	700	40.86
Thoracic abdomen	276	16.11
Spine	49	2.86
Upper limbs	231	13.49
Lower limbs	457	26.68
Total	1713	100

Among upper limb injury [Table 8], the femur was most commonly involved (12.14%) followed by the tibia, foot, pelvi-acetabulam, calcanium, and talus. Hip dislocation occurred in 0.8% cases and lower limb amputation in 1.2% cases.

Table 9 shows that 34.68% of patients were under the influence of alcohol while 65.32% were nonalcoholic during the accident.

Discussion

Injuries and deaths due to RTAs are one of the major public health problems across the globe, especially in developing countries due to a lack of comprehensive legislative measures. It will have an immeasurable impact on the families affected by RTIs.

RTAs are amenable to remedial actions. With improved traffic rules, better road conditions, prompt roadside trauma, first-aid, and hospitals better equipped with managing Road Traffic Accidents (RTAs), the rate of casualties due to road accidents

Table 4: Distribution of head injury pattern

Head Injury	*n*	%
ICH	218	12.73
EDH	194	11.32
SDH	164	9.57
SAH	124	7.24
Total	700	40.86

ICH: Intracranial hemorrhage; EDH: Extradural hemorrhage; SDH: Subdural hemorrhage; SAH: Subarachnoid hemorrhage

Table 5: Analysis of thoracoabdominal injury

Thoracoabdominal injury	*n*	%
Perforation	29	1.7
Liver laceration	24	1.4
Spleen laceration	4	0.2
Bladder injury	20	1.2
Lung contusion	36	2.1
Rib	27	1.6
Soft tissue injury	136	7.9
Total	276	16.1

Table 6: Analysis of spine injury

Spine injury	*n*	%
Cervical	0	0
Thoracic	22	1.3
Lumbar	27	1.6
Sacral	0	0
Coccygeal	0	0
Total	49	2.86

can be decreased. Our study aims at understanding the incidence and pattern of RTIs only in tribal populations in this geographical location (Jharkhand). The findings of this study may provide insights on better medical management of RTAs.

Demographic profile: Our data showed that out of the total 5422 cases, 31.59% of cases belonged to the tribal population. Among those 73.4% of victims were males and 26.6% victims were females; which was much higher than the data from the National Crimes Records Bureau wherein only 15% of the road accident victims were females.[10] The male-female ratio in our study was 2.76:1 while the study by Gururaj had a male-female ratio of 4:1 to 5:1.[8] The study conducted by Hadaye reported that the majority of victims (87.6%) were male.[11] A similar finding was also reported by Shaira that the majority (86.1%) of RTA victims were males.[12]

The reason for the high incidence of RTAs in males could be due to their participation in high-risk activities such as recklessness driving/riding, over-speeding, and drunken driving without wearing any protective gear, hormonal influence leading to thrill-seeking, over-confidence, and late-night driving. One of the reasons could also be due to the higher number of males involved in outdoor activities. On the contrary, females are involved in various indoor activities mostly due to cultural background and extra precaution

Table 7: Distribution of patient according to upper limb injury

Upper limb injury	*n*	%
Scapula		
>>body	2	0.11
>>glenoid	2	0.11
Humerus		
>>neck	15	0.87
>>shaft	39	2.27
>>condyle	33	1.93
Radius		
>>head/neck	6	0.35
>>shaft	17	0.99
>>distal end	9	0.52
Ulna	16	0.93
Radius + ulna	49	2.86
Clavicle	15	0.87
Hand	17	0.99
Amputation	11	0.64
Total	231	13.49

Table 8: Distribution of patient according to lower limb injury

Lower Limb Injury	*n*	%
Pelvic	15	0.88
Acetabular	4	0.23
D/L HIP		
Post	10	0.58
Ant	0	0
Central	3	0.18
Femur		
Neck	52	3.03
IT/ST	48	2.80
Shaft	76	4.44
Condyle	32	1.87
TIBIA		
Condyle	28	1.63
Shaft	97	5.67
Pilon	11	0.65
Malleolar	22	1.28
Talus	3	0.18
Calcaneum	11	0.64
Foot	25	1.46
Amputation	20	1.16
Total	457	26.68

Table 9: Distribution of patient according to alcoholic influence during an accident

Alcoholic influence	*n*	%
Present	594	34.68
Absent	1119	65.32
Total	1713	100

taken by family members to keep them safe. However, a study from Albania shows the predominant involvement of females in RTA which may be due to socioeconomic reasons.[13]

Age-wise Distributions of Cases: In our study, the highest numbers of victims (31.41%) were seen in the age group of 21–30 years followed by 31-40 years (19.21%) and 11–20 years (19.03%). A study conducted by different other researchers and findings showed a similar data trend with the highest numbers of victims in 20–30 years followed by 31–40 years of age group.[11,14] In the study by Shaira, the majority of victims (45%) belonged to the age group of 19–39 years followed by 40–59 years.[12]

Loss of such a young age group not only weakens the families but also acts as a socioeconomic burden on the economy and also slows down the net growth economic rate in the longer run. Young drivers being inexperienced have poorly developed skills in controlling vehicles, lack perceptual and cognitive skills that are crucial for safe and effective motoring. Many young drivers have been found using phones while driving; they get easily distracted which could be one of the reasons for RTA.

Human behavior has been identified as an exclusive or partial contributor to the causation of the vast majority of injury. In contemporary societies, injury prevention has relied preferentially on passive safety, with considerable attention paid to the identification of environmental risk factors and the development of effective safety technologies.[15]

Mode of Transportation: Mode of transportation is significantly linked to RTA in many studies. In our study, 52.13% of patients were using two-wheeler, 36.96% of patients were pedestrians, and 6.3% using heavy vehicles. A study conducted by Ruikar[16] and data published in the National Crimes Records Bureau[10] showed that the majority of victims of road accidents were occupants of two-wheelers. Shrestha's study found that two-wheelers (38.4%) were most commonly involved in RTA followed by four and six-wheeler.[17] It reflects that two-wheelers are the most common mode of transport in India. Maximum casualties on two-wheelers could be due to reckless driving, not wearing helmets, or not following traffic rules. However, a study by Choulagai in Nepal found that six-wheelers were more involved than others.[18]

Site and Pattern of Injuries: In this study, head injury was the most common type of injury in patients of RTI which occurred in 40.86% patients followed by lower limb (26.68%), thoracoabdomen (16.11%), upper limb (13.49%), and spine (2.86%) injury. Among head injury patients, the majority (12.73%) of patients had ICH, followed by EDH (11.32%), SDH (9.57%), and SAH (7.24%). Soft tissue injury (7.9%) was the commonest injury in thoracoabdomen followed by lung contusion (2.1%), perforation (1.7), rib fracture, liver laceration, bladder injury, and spleen contusion. Spinal involvement was seen only in the lumbar (1.6%) and dorsal region (1.3%). Among upper limb injury, the humerus was the most commonly involved bone (5.07%) followed by radius and ulna, hand, clavicle, and scapula in decreasing order. The femur was most commonly involved (12.14%) among the lower limb

followed by the tibia, foot, pelvi-acetabulam, calcanium, and talus. Hip dislocation occurred in 0.8% of cases. Kahn's study also found head injury as commonest (68.8%) followed by knee, lower leg (32.7%) and shoulder, and upper arm (23.9%). Thoracoabdomen, spine, and pelvis were involved in 9.3% cases while multiple body regions were involved in 4.3% of cases.[19] The highest incidence of head injury (34.1%) was also reported by Jha study which was followed by injuries to the lower limbs (13.7%), face (10.7%), chest, pelvis, upper limb, and spine. Abrasions and lacerations were commonest external injuries.[20] Shrestha found that head injury (41.1%) was the commonest injury followed by fracture (25.9%), external injury (like abrasion, lateration, cut injuries), and spinal injury.[17] Our findings were contrary to the study conducted by Ravikiran in Mangalore who observed that the most common site of injury was the abdomen (49%).[21] According to the Al-Thaifani study, fracture (47.81%) was the most common type of injury in the victims of RTI, followed by internal hemorrhage (29.5%) and cut wound/laceration (9.62%). Dislocation injury was seen in 5.56% of the victims. The lower limb (42.18%) was the most common site of injury, followed by the head (17.93%) and thorax (11.81%).[22] Whereas in a study conducted at Kolkata, 68.44% had fractures, 28.64% had a head injury, while 19.91% had abrasion, bruise, hematoma, and visceral injury.[23] Sharma's study found that soft tissue, head, and extremities were the major sites of injuries.[24]

A possible explanation for more injuries on the upper body parts might be that motor vehicle occupants did not use seat belts, resulting in a forwarding jerk during a collision and a higher rate of injury. Similarly, lack of helmet use could be the possible reason for more head injury among two-wheeler users. Knowledge of injury pattern could be helpful while planning emergency and trauma care services and also in designing and implementation of safety measures.

Alcohol consumption and RTA: The role of alcohol in impairing driving ability is well-documented. Besides, the impairment increases as the blood alcohol level rise. Besides, the risk of accidents is higher in youngsters and elderly people for similar blood alcohol levels.[20] In India, alcohol consumption is one of the major causes of RTA.[16] In this study, 34.68% of patients were under the influence of alcohol during the accident. This is in higher proportion when compared to study done by Hadaye,[11] Kiran,[21] Rajesh,[25] and Kumar[26] who found that 13.86%, 13%, 22.5%, and 10.1%, respectively were under influence of alcohol during the accident. Our findings were low compared to a study done by Baburao who reported that 62% had consumed alcohol while driving.[9] Nearly 34.2% of victims in the Konlan study were under the influence of alcohol at the time of the accident.[27]

Relevance to the practice of primary care physicians

The finding of our study sheds light on the burden of trauma in the tribal population of Jharkhand. In our country, many primary and secondary health centers lack certain essential facilities such as operating theatres, magnetic resonance imaging (MRIs), computed tomography (CT) scans, blood banks, and specialists for evaluating and treating severe cases of trauma. Therefore, many patients need to be referred to higher centers. Simple information such as the pattern of injuries and involvement of body parts in the RTA cases may be useful to the local physicians and primary/secondary health centers to assess the gravity of injuries to refer the patients to higher centers after primary treatment and stabilization of the patient.

Conclusion and Recommendations

The present study showed that RTAs were more common in the younger male population. Drunk driving (alcohol influence) was one of the major causes of RTA. The majority of RTAs involved a two-wheeler vehicle. Head injury was the most common type of injury, followed by lower limb injury. Common upper limb injuries were in the humerus and radius and ulna region. The majority of lower limb injuries involved tibia and femur. Common thoracic-abdomen injuries were soft tissue injury and lung contusion.

RTAs are preventable. The incidence of RTAs can be minimized by increasing awareness among the drivers, family, and community. Road safety education should be incorporated at the school level with practical demonstrations. Breath testing for analyzing alcohol levels among drivers should be done. The government should step in for an efficient transport system, safety traffic rules, cashless treatment policy in an emergency, instructions for strict governance and implementation of driving license, traffic rules, and regulations by the police and transport authority. Protective measures to minimize RTA in hilly roads include the installation of parapet/guide walls, safety barriers, proper drainage, suitable sign-ages, markings, etc., During fog, the use of luminous paints/strips should be used for signboards. The parapets and guide walls should be properly marked on both ends and on the hillside at regular intervals to give a feeling of safety to the drivers and pedestrians. Strict enforcement of the existing legislation regarding usage of helmets, seatbelts as well as driving under the influence of alcohol and cell phone driving is the need of the hour.

Limitations of the Study

1. This is a single hospital-based study and involves only a tribal population, hence the results of this study may not be generalized to the general population.
2. Many parameters could not be assessed due to the short duration of the study.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and

due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Key Messages

A road traffic accident is a major public health problem that needs to accelerate the efforts of road safety preventive measures. Road safety education should be promoted.

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Conflicts of interest

There are no conflicts of interest.

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