

Pattern of Limb Injuries in Road Traffic Accident in Medico-Legal Autopsy Cases Brought to Mortuary of FMT Dept, RIMS, Imphal

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ABSTRACT

The injuries caused by road traffic accidents (RTAs) become a major public health problem worldwide and a major cause of morbidity and mortality with temporary or permanent disability. This cross-sectional study was conducted to assess the pattern of limb injuries in road traffic accidents in medico-legal autopsy cases brought to the mortuary of the Department of Forensic Medicine and Toxicology of a Tertiary Care Teaching Institute in Imphal. The estimated sample size is around 210. Only male cases brought for autopsy were analyzed. All the cases of road traffic accidents with limb injuries with or without injury to other parts of the body and only upper or lower limb injuries were included in our study. Data entry was done using a Windows-based statistical package for social sciences [SPSS] version 21.0 (Armonk NY: IBM Corp). To establish an association between the categorical variables with the type of injuries, the C2-test is applied, and interpretation is made accordingly. All comparisons are two-sided and the *p-values* of < 0.05, < 0.01, and < 0.001 are taken as the cut-off values for significance, high significance, and very high significance, respectively. From our study, the highest number of victims were observed among the age of 31 to 40 years which accounted for 27.6%; and the lowest number of victims of about 1% was observed among the age group of 0 to 10 years. The maximum number of victims were due to two-wheeler accidents which accounted for 52.4% of which 76 (69.09%) fatalities were riders. A maximum of fatalities was due to injuries to vital organs associated with shock and hemorrhages which accounts for 92.85% of cases and 7.14% of fatalities were due to injuries to the limb associated with shock and hemorrhages. The relationship of the cause of death with the type of injuries, it was observed that the cause of death has a very highly significant association with the type of injuries as evidenced by $p < 0.001$. Road traffic accidents are preventable. Strict traffic laws and penalties have to be imposed to curb this ever-growing menace. The result of this study enables a healthcare provider to predict fracture and site of injury. Strict enforcement of road safety regulations and improving emergency medical services may prevent untimely deaths and disabilities caused by RTAs. Awareness campaigns concerning safety rules can be targeted at high-risk groups with an emphasis on the improvement of the roads.

Keywords: Road traffic accidents, Limb injuries, Patterns, Preventable.

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INTRODUCTION

A road traffic accident can be defined as an event that occurs on a way or street open to public traffic; resulting in one or more persons being injured or killed, where at least one moving vehicle is involved.¹ In 2004, road traffic accidents ranked as the 9th leading cause of death worldwide and are expected to be 5th by 2030.² Worldwide about 3000 people die every day and 30,000 people are injured seriously in traffic accidents.³ The injuries caused by road traffic accidents (RTAs) become a major public health problem worldwide and a major cause of morbidity and mortality with a temporary or permanent disability. Fast urbanization, industrialization, population explosion and people migration in India have contributed to the tremendous rise in road transport in the last two decades.⁴ This contributed to an increasing level of road traffic, resulting in an increased probability of road accidents. RTAs involve forensic investigations that allow risk factors and causes of death to be examined. Forensics experts often assess if an RTA has induced disabilities and if so, they quantify the percentage of impairment.³

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The most prevalent injury was fracture of bones, particularly the head and neck, and the lower limbs and then upper limbs followed closely while the least injured portion is the abdomen. The present work is designed to study the pattern of limb injuries to understand the circumstances and mechanism of causation of these injuries in road traffic accidents in Imphal, Manipur.

MATERIALS AND METHODS

The present work is a cross-sectional study. The study was conducted in the Department of Forensic Medicine and Toxicology of a Tertiary Health Care Center in North-East, India. The study population was road traffic accident death cases with limbs injury with or without injuries to another part of the body to the mortuary of Forensic Medicine and Toxicology Department, Regional Institutes of Medical Sciences, Imphal, for medico-legal autopsies were included in our study. The study duration is between September 2019 to August 2021. The estimated sample size is around 210. Only male cases brought for autopsy were analyzed. All the cases of road traffic accidents with limb injuries with or without injury to other parts of the body and only upper or lower limb injuries were included in our study. Unknown causes of death and decomposed bodies were excluded from our study. Data entry was done using a Windows-based statistical package for social sciences [SPSS] version 21.0 (Armonk NY: IBM Corp). All the categorical variables like age, sex, religion, etc and patterns of upper limb injuries and lower limb injuries viz., abrasion, laceration, fracture, contusion etc, considered were again described as the number of cases and percentages. To establish the association between the categorical variables with the type of injuries, a C2-test is applied, and interpretation is made accordingly. All comparisons are two-sided and the *cc p-values* of < 0.05, < 0.01, and < 0.001 are taken as the cut-off values for significance, highly significance and very highly significance, respectively.

RESULTS

A total of 210 cases of fatal road traffic accidents with limb injuries were studied during the study period in the mortuary of the Regional Institute of Medical Sciences from September 2019 to August 2021. From our study, the highest number of victims were observed among the age of 31 to 40 years which accounted for 27.6%; and the lowest number of victims of about 1% was observed among the age group of 0 to 10 years (Table 1). The maximum number of victims were due to two-wheeler accidents which accounted for 52.4% of which 76 (69.09%) fatalities were riders. Further, Pedestrian was observed to be the next major fatalities of road traffic accident cases which account for 28.5% and four-wheelers about 19.04% in the majority about 30 (75 %) fatalities were among drivers (Table 2). In most road traffic accident cases, about 76.1% survived for 1 to 24 hours before they succumbed to their injuries. Further, it is observed that 2 cases survived for more than 1 week but unfortunately, he succumbed to his injuries (Table 3). A maximum of fatalities were due to injuries to vital organs associated with shock and hemorrhages which accounts for 92.85% of cases and 7.14 % of fatalities were due to injuries to the limb associated with shock and hemorrhages (Table 4). The brief history which we obtained, has no significant association with the type of injuries, (*p-value* => 0.05). The findings reveal that brief history within the fracture, four-wheelers (9.4%) and two-wheelers (7.3%) are found the highest and lowest and within the abrasion, a

Table 1: Distribution of cases by age of road traffic accident decrease

Parameter	No. of cases (n = 210)	Percentage (%)
Age (years)		
0–10 yrs	2	1.00
>10–20 yrs	20	9.5
21–30 yrs	30	14.3
31–40 yrs	58	27.6
41–50 yrs	34	16.1
51–60 yrs	32	15.2
61–70 yrs	24	11.4
71–80 yrs	10	4.7

Table 2: Types of victims of road traffic accident

	No. of cases (n = 210)	Percentage (%)
I Two-wheeler	110	52.4
1. Rider	76	69.09
2. Pillion rider	34	30.90
II Four-wheeler	40	19.04
1. Driver	30	75.04
2. Occupant	10	25.00
III Pedestrian	60	28.5
Total	210	100

Table 3: Showing survival period of road traffic accident victims

Survival period	No. of cases	Percentage (%)
On the spot	30	14.28
Within 1 hour	16	7.6
1–24 hours	160	76.1
>1 week	2	1
Unknown	2	1
Total	210	100

Table 4: Showing cause of death of road traffic accident ceases

Cause of death	No. of cases	Percentage (%)
Injury to the limb with shock and hemorrhage	15	7.14
Injury to vital organs associated with Shock and hemorrhage	195	92.85
Total	210	100

pedestrian (44.4%) and two-wheeler (43.6%), the highest and the lowest; within the contusion, two-wheelers and pedestrian, the highest and the lowest; within laceration, no case of a pedestrian



Table 5: Type of injuries-wise distribution of road traffic accidents according to brief history

Parameters		Type of Injuries					χ^2 -value	df	p-value	
		Abrasion	Contusion	Laceration	Multiple injuries	Total				
fracture 16 (7.6%)		92 (43.8%)	34 (16.2%)	8 (3.8%)	60 (28.6%)	210 (100.0%)				
Brief history	Two wheeler	8 (7.3%)	48 (43.6%)	22 (20.0%)	4 (3.6%)	28 (25.5%)	110 (100.0%)	3.340	8	.911
	Pedestrian	2 (5.6%)	16 (44.4%)	4 (11.1%)	-	14 (38.9%)	36 (100.0%)			
	Four wheeler	6 (9.4%)	28 (43.8%)	8 (12.5%)	4 (6.2%)	18 (28.1%)	64 (100.0%)			

Table 6: Type of injuries-wise distribution of road traffic accidents according to cause of death

Parameters		Type of injuries					χ^2 -value	df	p-value	
		Abrasion	Contusion	Laceration	Multiple injuries	Total				
fracture 16 (7.6%)		92 (43.8%)	34 (16.2%)	8 (3.8%)	60 (28.6%)	210 (100.0%)				
Cause of death	injury to limb	8 (40.0%)	-	-	2 (10.0%)	10 (50.0%)	20 (100.0%)	32.595	8	<.001
	shock and hemorrhage	2 (1.9%)	58 (55.8%)	14 (13.5%)	-	30 (28.8%)	104 (100.0%)			
	injury to vital organs	6 (7.0%)	34 (39.5%)	20 (23.3%)	6 (7.0%)	20 (23.3%)	86 (100.0%)			

χ^2 -value; df: degree of freedom; p-value: probability due to chance factor

while four-wheeler the highest and two-wheelers the lowest. Within the case of multiple injuries, a pedestrian (38.9%) and two-wheeler (25.5%) are noticed as the highest and the lowest respectively (Table 5). The relationship of cause of death with the type of injuries, it was observed that cause of death has a very highly significant association with the type of injuries as evidenced by $p < 0.001$. Fractures were highly associated with injury to limbs (40.0%). Contusions were highly associated with injury to vital organs (23.3%). Lacerations were highly associated with injury to the limb (10.0%) (Table 6).

DISCUSSION

In this study, the victims chosen were males. The study conducted by Murarka *et al.*⁵ is also similar to our study. It shows that male has more road traffic accidents than that of his counterpart females. The predominance of males explained that males are more prone to lead a more active life, more exposed to traffic accidents and trauma, etc. The majority of the victims were in the age range of 31 to 40 years with the highest percentage (27.6%) and lowest incidence (1%) seen in the age range of 0 to 10 years which is similar to studies conducted by Chaurasia AK *et al.*⁶ The highest in the age group 31 to 40 years could be because this is the most active phase of life. In the case of the survival period, two cases did not know the period. 1% of the cases survived for more than 1-week followed by those who survived for 1 to 24 hours (76.1%). Our finding is similar to Chaurasia *et al.*⁷ where most of the victims (30%) died within 12 to 24 hours whereas a finding of Singh H *et al.*⁸ showed that 39.5% of deaths occurred within 1-hour which is different from our finding. In the case of vehicles involved, maximum cases were caused by two-wheeler accidents (52.4%) and next was the pedestrian (28.5%) followed by four-wheeler

(19.04%) which is similar to the findings of Bhuyan *et al.*,⁹ This could be due to fact that two-wheelers are the most commonly used means of transport in Manipur. In terms of the type of victims, drivers of four-wheelers (75.04%), were found to be of highest percentage, followed by riders of two-wheelers (69.09%), pillion riders (30.9%), and pedestrians (28.5%). This finding is similar to a study conducted by Mishra *et al.*¹⁰ This could be due to the casual attitude of two-wheeler riders to traffic rules. The type of victim has no significant association with the type of injuries, insignificant p -value > 0.05 . It is observed that among the individual injuries, abrasion in 92 cases (43.8%) is the most common. A laceration is the least which is seen in 8 cases (3.8%), while a fracture is seen in 16 cases (7.6%) and a contusion is seen in 34 (6.2%). This contrasts with the study by George AS *et al.*¹¹ where Pillion riders were injured more often in collisions between two and four-wheelers. Our findings are similar to a study by Jhakar *et al.*¹² and different from work done by Mishra *et al.*¹⁰ which found that common injuries were lacerations and fractures (30%). Regarding the cause of death, injury only to the limb was around 20 fatal cases and the cause of death due to shock and hemorrhage was 104 cases and injury to vital organs was around 86 cases. This is a significant finding as the p -value is < 0.001 . This finding is different from previous workers^{13,14} where limb injury alone has never been reported as the sole cause of death. This proves that even if the limb is involved in a vehicular accident, it could be fatal if there are multiple limb injuries or if there is a fracture involved. This finding has not been seen in studies done by previous workers. In this study, cases were taken that were brought to the Regional Institutes of Medical Sciences, so our finding may not be representative of all the fatal road traffic accidents with limb injuries happening in the state of Manipur.

CONCLUSION

Road traffic accidents occur when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree or utility pole, it is an accident that takes place on the road between two or more objects, one of which must be any kind of moving vehicle. From the present study, it is found that the maximum number of victims was due to two-wheeler accidents and it is observed that most of the fatalities occurred after reaching the Hospital, mostly due to a lack of prompt aid for the victim and less trauma center in Manipur. In our study, injury mostly seen on the victims is abrasion and a few cases of fracture. The cause of death is due to injury to major vessels involved in the fracture causing shock and hemorrhage. Road traffic accidents are preventable. Strict traffic laws and penalties have to be imposed to curb this ever-growing menace. Road traffic accident injuries constitute a major but neglected emerging public health problem. There is a need for legislation against alcohol consumption among motorcyclists during riding hours and enforcement of speed limits by the government to reduce RTA among motorcyclists. The result of this study enables a healthcare provider to predict fracture and site of injury. Strict enforcement of road safety regulations and improving emergency medical services may prevent untimely deaths and disabilities caused by RTAs. Awareness campaigns concerning safety rules can be targeted at high-risk groups with an emphasis on the improvement of the roads. The fact that the economically productive age group was mostly involved should prompt an urgent public policy response with special reference to education, engineering, environment, and emergency care of road accident victims.

ETHICAL CLEARANCE

Ethical approval from the Research Ethical Board (REB), Regional Institute of Medical Sciences (RIMS), Imphal, was obtained. Informed written consent was obtained from the deceased party. Code was used during the collection of data to maintain confidentiality. The data obtained was kept in the Department of Forensic Medicine, RIMS, Imphal. Access to the data will be restricted to the investigator and the guides. The study was self-sponsored and there was no conflict of interest.

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