

ORIGINAL ARTICLE

Epidemiology of Road Traffic Injuries in a Tertiary Care Centre of LucknowAshish Chauhan¹, Naim Ahmed², Jai Veer Singh³, Vijay Kumar Singh⁴, Ajai Singh⁵, Suresh Kumar⁶

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Abstract

Introduction: Road traffic injuries are an important cause of mortality and morbidity worldwide. It is the second leading cause of mortality in 15-29 year age group and if the current trend continues then it will be the 5th leading cause of overall mortality worldwide. **Objective:** To know the epidemiology of Road Traffic Injuries as seen in a tertiary care centre of Lucknow. **Methodology:** A cross-sectional study was done among patients of RTI admitted at a Tertiary Care Centre. A systematic random sampling technique was used to collect a sample of 267 patients of RTI in the study duration of four months. A pretested semi-structured interview schedule was used to collect necessary information regarding the time, place and the person involved in the accident. Descriptive statistics for continuous variables and frequency, percentage for categorical variables were determined. Chi-square test of uniform distribution was used to test distribution of variables. The level of significance was set at 0.05. **Results:** The mean age of the patients of RTI was 32 years and majority of the patients of RTI belonged to 16 to 30 years age group. Males outnumbered females giving a Male: Female ratio of 6.85: 1. Majority of the patients were from rural areas. A high proportion of the patients were MTV users. **Conclusion:** Fracture was the most common type of injury in the patients of RTI and Lower limb was the most common site of injury, followed by head.

Key Words

Road Traffic Injuries; Road Traffic Accidents; RTI

Introduction

Development of any society is always accompanied by a lot of changes and increased transportation is imperative to it. This leads to increased mobility of the population for work, access to healthcare and other facilities, and for recreation purposes. This again is a two-pronged change as on one side it leads to economic development while on other hand it is also accompanied with increase in Road Traffic Injuries (RTI).

Road Traffic Accident (RTA) is said to occur when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree or utility pole. Any injury occurring as a result of Road Traffic Accident is referred to as Road Traffic Injury by WHO. [1]

It has been estimated that, unless immediate action is taken, road deaths will be the fifth leading cause of death by 2030, resulting in an estimated 2.4 million

fatalities per year. [2,3] RTI is the second leading cause of mortality in the 15-29 year age group. [1]

Taking this into consideration, the United Nations has rightly proclaimed 2011-20 as "The Decade of Action on Road Safety" so that the present rising trend of road accidents stabilizes & is reversed by the year 2020. [4] In India, during the year 2011, there were around 4.98 lakh RTA which killed 1.42 lakh people and injured more than 5 lakh persons, many of whom are disabled for rest of their lives. In Lucknow, 1270 RTA were reported out of which 493 accidents were fatal. These accidents resulted in death of 517 persons and injured 741 persons. With an accident severity of 40.7, Lucknow ranks 12th in all the cities of India in terms of Accident severity which is the number of deaths per 100 accidents. [4]

As Lucknow is the capital of the most populous state of India and very less studies focusing on Epidemiology of RTI have been done in this region, so this study is an attempt to know the epidemiology of Road Traffic

Injuries by studying the bio-social profile, circumstances of accidents and the outcome of treatment among patients of RTI seeking treatment in a tertiary care centre so that pattern of injury and risk factors associated with the problem can be identified at a regional level where study was conducted.

Aims & Objectives

1. To study the Bio-social profile and circumstances of accident among patients of Road Traffic Injuries admitted in a Tertiary Care Centre.
2. To study the injury profile of these patients.

Material and Methods

Study setting: Trauma Centre, KGMU, Lucknow (Tertiary Care Centre) **Study design:** Cross-sectional Study **Study population:** Patients of RTI admitted at a Tertiary Care Centre in Lucknow. **Study unit:** Patient of RTI admitted at Trauma Centre, KGMU, Lucknow. **Study period:** Duration of data collection was four months, from October 2012 to January 2013 **Sample Size:** The sample size was calculated by taking the proportion of disability in the outcome of patients of RTI as 50 percent. With the permissible error of 6% in the prevalence and a 95% confidence level, the sample size was calculated to be 267. **Sampling technique:** A systematic random sampling technique was used to select the representative sample of patients of RTI admitted at Trauma Centre, KGMU, Lucknow. Sampling interval was decided on the basis of injury surveillance data from Trauma Centre for the months of October 2011 to August 2012. Considering average admission rate, duration of study and sample size, it was decided to register every 4th patient admitted at Trauma Centre with RTI who gave consent for inclusion in the study (consent was taken from relatives in case of unconscious patient) till the desired sample size was achieved

Inclusion criteria:

1. Patients of RTI admitted at Trauma Centre, who were conscious and cooperative.
2. Patients of RTI admitted at Trauma Centre, who were unconscious and had cooperative attendants.

Exclusion criteria:

1. Non co-operative patient/attendant.
2. Patients who were brought dead.

Interview schedule: A pretested semi-structured interview schedule was used to collect necessary information regarding the time, place and the person involved in the accident.

Measurements:

Socio-economic status:

1. Kuppaswamy Socio-economic Scale for Urban areas modified for 2012.
2. Udai Pareek Scale for Socio-economic status for rural areas.

Disability: Ten points modified Barthel Index. The Barthel Index is a 10-item scale (range 0 to 20) that measures the patient dependence for help with the activities of daily living and is of greatest value at the severe end of the disability spectrum and Barthel Index score of less than the lower tertile (<13) was classified as disability. [5]

Pre-Testing: The schedule was pretested on a sample of 30 patients admitted for RTI. Relevant modifications were made in the schedule to overcome the difficulties faced during pretesting.

Statistical Analysis: Statistical analysis was done using SPSS version 17.0. Descriptive statistics for continuous variables and frequency, percentage for categorical variables were determined. Chi-square test of uniform distribution was used to test distribution of variables. The level of significance was set at 0.05.

Prior permission from appropriate authorities was taken for conducting the study that mainly included access to records and interviewing the patients.

Results

The mean age of the patients of RTI was 32 years with the standard deviation of 13.95 years. Majority of the patients of RTI (44.6%) belonged to 16 to 30 years age group, followed by 33 percent of the patients in 31 to 45 years age group. Males (87.3%) outnumbered females (12.7%) giving a Male: Female ratio of 6.85: 1. Majority of the patients (64%) were from rural areas. Married patients were 66.7 percent of the sample. Majority of the patients (27.7%) were educated up to high-school. Patients belonging to Socio-economic class 3 were 43.4 percent and only 1.5 percent and 0.7 percent patients belonged to socio-economic class 1 and class 5 respectively. [\[Table 1\]](#)

A high proportion of the patients of RTI were either MTV driver (43.1%) or MTV pillion (15.4%). Pedestrians were 14.2 percent and Pedal cyclists were 4.9 percent. Helmet was used by only 15.4 percent of MTV users while the use of seat belt at the time of accident was reported in only 2 patients (14.3%) using LMV. [\[Table 2\]](#)

Among the patients who were driving the vehicle, 16.9 percent did not have driving license. Over-speeding, alcohol intoxication and sleep deprivation was reported by 14.2, 8.6 and 0.7 percent of the patients. Around 16 percent of the patients cited poor visibility as the cause of their accident.

Most of the accidents occurred on Tuesdays (19.9%) and Wednesdays (19.5%) while less number of accidents were reported on Saturdays (9.4%) and Sundays (10.5%). The difference in the number of accidents on different days of the week was significant. Most of the accidents occurred during day time with 26.2 percent accidents between 12:01 to 16:00 hours and only 4.1 percent accidents during 00:01 to 04:00

hours. The difference in number of accidents occurring at different time was statistically significant. [Table 3] Majority of the accidents occurred either on city/municipal roads (31.1%) or on MDR/rural roads (30.0%). Divider was absent on majority of the roads (67.8%). LMVs, HMTVs and Tractor-trolley were the counterpart of accident in 30 percent, 21.7 percent and 17.2 percent of the accidents respectively. [Table 4] Fracture (81.3%) was the most common type of injury in the patients of RTI, followed by cut wound/laceration (45.7%) and internal hemorrhage (34.1%). Crush injury was seen in 5.6 percent of the patients of RTI. Lower limb (60.3%) was the most common site of injury, followed by head (39.0%). [Table 5]

Out of the total 267 patients registered in our study, 35 patients died during the course of their treatment while 36 patients were discharged with permanent disability.

Discussion

Bio-social Characteristics: The present study was conducted to know the epidemiological profile of the victims of Road Traffic Injuries presenting in a Tertiary Care Centre. Nearly half of the patients were young belonging to 16- 30 year age group and the mean age was 32 ± 13.95 years. Similar results have been shown in other studies on RTI (6–12). The increased proportion of young people can be due to higher mobility of this age-group due to economic productivity and also due to high risk taking behavior. Males (87.3%) outnumbered females (12.7%) giving a male: female ratio of 6.85: 1. This ratio was in agreement with other studies conducted in India. [8, 13, 14] However, studies from countries other than India, show a different Male: Female ratio. [15, 16] The high preponderance of males can be attributed to high mobility of males and their high exposure to traffic coupled with their tendency to take risks. However, in developed countries the difference in proportion of males and females was not much because of less difference in employment and mobility of either sex. Majority of the patients (64%) were from rural areas. Similar result was shown in the study by Mishra B et al [6], where victims from rural areas (65.83%) were more as compared to urban areas (34.17%). This might be due to the ignorance/ unawareness of traffic rules.

Patients belonging to Socio-economic class 3 and 4 were more than four-fifth of the total patients which was in agreement with the study by Tiwari RR et al [13]. This could be due to higher proportion of the middle class relying on Motorized Two-wheeled Vehicles which are more vulnerable to accidents.

Accident related variables:

MTV users, pedestrians and pedal-cyclist constituted more than three-fourth of the victims. Similar

observations were reported in other studies. [9, 14, 17–19] Safety measures were used only by approximately 15 percent of the patients. The use of safety measures was in agreement with another study done by Chalya P et al [7]. This again highlights the risk taking behavior of young people and poor implementation of laws of road safety.

Majority of the accidents occurred either on city/municipal roads or on MDR/rural roads. Proportion of the accidents on highways was less than these roads. Divider was absent on more than two-third of the roads where accidents occurred. This was in agreement with previous findings of a study from India by Bayan P et al [14].

Majority of the accidents occurred on Tuesdays (19.9%) and Wednesdays (19.5%) while less number of accidents were reported on Saturday (9.4%) and Sunday (10.5%). These finding were different from other studies [12, 14] where majority of accidents occurred on weekends. This difference could be due to increased involvement of rural population in our study whose mobility is less affected by weekend or weekday.

As reported previously from other studies [6, 7], accidents during night time were less than the day time. This again could be due to less proportion of accidents in our study on highways where there is more traffic and increased risk of accidents during night time. Injury pattern:

Fracture was the most common type of injury in the patients of RTI, followed by cut wound/laceration and internal hemorrhage. Lower limb was the most common site of injury, followed by head and upper limb. Similar trend has been demonstrated in other studies from India and abroad. [6–8, 10, 14] This shows that the injury pattern is generally the same following Road Traffic Accidents and this knowledge of Injury pattern could be helpful while planning Emergency and Trauma Care Services and also in designing and implementation of safety measures.

The present study was limited to only one tertiary care centre and though it caters to a major portion of victims of RTI but still a study including some private hospitals could have given a more accurate estimate of the burden of disease.

Conclusion

The results of this study shows a high preponderance of younger age groups, males, socio-economic class 3 & 4, and of MTV users amongst the victims of RTI. Fracture was the most common injury and lower limb and head were the most common sites of injury.

Recommendation

Attempts should be made at every level to minimize the occurrence of road traffic accidents and also to

reduce the morbidity and mortality following RTI to a minimum level. This would require IEC and BCC activities specially targeted towards young people as they share the majority of the burden of Road Traffic Injury.

Authors Contribution

AC, NA, JVS & VKS were involved in protocol writing. Interview schedule was prepared by AC, JVS, AS, SK. Data Collection was done by AC and Data analysis was done by VKS & NA. Manuscript writing was done by AC, JVS & VKS

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Tables

TABLE NO. 1 BIO-SOCIAL CHARACTERISTICS OF THE PATIENTS OF RTI

Bio-social Characteristics	No.	Percent
Age group (in completed years)		
≤ 15	23	8.61
16 to 30	119	44.57
31 to 45	88	32.96
46 to 60	29	10.86
> 60	8	3.00
Mean ± SD	32 ± 13.95	
Sex		
Male	233	87.27
Female	34	12.73
Residence locale		
Urban	96	35.96
Rural	171	64.04

Bio-social Characteristics	No.	Percent
Marital status		
Married	178	66.67
Widow/Widower	2	0.75
Unmarried	87	32.58
Education		
Professional Degree	7	2.62
Postgraduate And Above	4	1.50
Graduate/Intermediate/Post High School Diploma	53	19.85
High School	74	27.72
Middle School	54	20.22
Primary/Literate	30	11.24
Illiterate	45	16.85
Socio-economic class*		
Class 1	4	1.50
Class 2	43	16.10
Class 3	116	43.45
Class 4	102	38.20
Class 5	2	0.75

*Modified Kuppaswamy Scale for Urban areas and Udai Pareek Scale for Rural areas

TABLE NO. 2 ROAD USER CATEGORY AND SAFETY MEASURES USED BY THE PATIENTS OF RTI

Characteristics of the patient	No.	Percent
Road User Category (n = 267)		
Pedestrian	38	14.23
Pedal Cyclist	13	4.87
MTV Driver	115	43.07
MTV Pillion	41	15.36
3-Wheeler Occupant	24	8.99
LMV Occupant	14	5.24
HMV Occupant	9	3.37
Tricycle Occupant	7	2.62
Others*	6	2.25
Safety Measure, If MTV user (n = 156)		
Helmet	24	15.38
None	132	84.62
Safety Measure, If LMV user (n = 14)		
Seatbelt	2	14.29
None	12	85.71

MTV = Motorised two-wheeled vehicle, LMV = Light motor vehicle, HMV = Heavy motor vehicle. *Others: Tractor-trolley, Bullock cart and Tonga.

TABLE NO. 3 DISTRIBUTION OF DAY AND TIME OF ACCIDENT OF THE PATIENTS OF RTI N = 267

Day of Accident	No.	Percent	p value
Monday	33	12.36	0.004
Tuesday	53	19.85	
Wednesday	52	19.47	
Thursday	36	13.48	
Friday	40	14.98	

Saturday	25	9.36	
Sunday	28	10.48	
Time of Accident (24 hour format)			
00:01-04:00	11	4.12	0.000
04:01-08:00	28	10.49	
08:01-12:00	60	22.46	
12:01-16:00	70	26.22	
16:01-20:00	59	22.10	
20:01-00:00	39	14.61	

TABLE NO. 4 DISTRIBUTION OF THE PATIENTS OF RTI ACCORDING TO CHARACTERISTICS OF ROAD AND COUNTERPART INVOLVED IN ACCIDENT

**MDR- Major District Road*

Characteristics	No.	Percent
Type Of Road		
National Highway	54	20.22
State Highway	50	18.73
City/Municipal Road	83	31.09
MDR* & Rural Road	80	29.96
Divider On Road		
Present	86	32.21
Absent	181	67.79
Counterpart Of Accident		
Fixed Object	8	3.00
Pedestrian	1	0.37
Divider	2	0.75
Bicycle	6	2.25
2-Wheeler	29	10.86
3-Wheeler	8	3.00
LMV	80	29.96
HMV	58	21.72
Animal	2	0.75
Tractor-trolley	46	17.23
None	27	10.11

TABLE NO. 5 DISTRIBUTION OF THE PATIENTS OF RTI ACCORDING TO TYPE AND SITE OF INJURY

Injury characteristics	No.	Percentage
Type of injury*		
Fracture	217	81.27
Dislocation	59	22.09
Cut wound/ laceration	122	45.69
Crush injury	15	5.62
Blunt injury	27	10.11
Internal hemorrhage	91	34.08
Site of injury*		
Head	104	38.95
Maxilo-facial region	46	17.23
Thorax	23	8.61
Abdomen	3	1.12

Upper limb	81	30.34
Lower limb	161	60.29
Spine	4	1.49
Pelvis	13	4.87