

original article

# A study on injuries sustained in road traffic accidents at a tertiary care level

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## ABSTRACT

**Aims:** The study was done to find out the types of injuries, modes of road traffic accidents and case fatality rate of road traffic accident cases from 1<sup>st</sup> April 2005 to 31<sup>st</sup> March 2010 in a tertiary care hospital.

**Materials and Methods:** The retrospective study conducted on hospitalized patients admitted with road traffic accidents in a tertiary care level from 1<sup>st</sup> April 2005 to 31<sup>st</sup> March 2010. Data collected from the registers maintained in the medical records department, follows the guidelines of International Classification of Diseases-10 coding.

**Results:** Of the 7,660 road traffic accident cases reported in a hospital from 1<sup>st</sup> April 2005 to 31<sup>st</sup> March 2010. Most of the cases and deaths were occurred in the age group of 15-44 years. Total deaths occurred due to road traffic accident was 249 (3.25%). Motorcycle rider injured in road traffic accident was more except other land transport accidents during the period from 2005 to 2010. Of the road traffic accident cases, fractures (42.7%) were more than superficial injuries (18.56%) and dislocations (2.6%).

**Conclusion:** This study mentioned that most of the cases and deaths were occurred in 15-44 years. Accidents of the economically productive people will affect their family. Hence to reduce the road traffic accidents by conducting public awareness program and strict enforcement of traffic rules.

**Key words:** Accident, female, male, road, traffic

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## INTRODUCTION

An accident is that “occurrence in a sequence of events which usually produces unintended injury, death, property damage.”

Road traffic accident is one of the leading causes of death. Overcrowding and lack of awareness and lack of awareness and poor implementation of essential safety precautions and increase in vehicular traffic have resulted in an increasing number of accidents but majority of the accidents are preventable. Deaths, disability and hospitalization due to road traffic accident injuries continue then it will affect the family's economic status. It leads to increase in morbidity and mortality.

Road traffic injuries (RTIs) are one of the leading causes of death in India and World. In developing countries larger proportion of vehicles involved in accidents are two wheelers

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and in developed countries four wheelers are more frequently involved in the accidents. In every accident there are as many major and minor injuries that requiring long periods of expensive care, nursing and treatment. It leads the family, nation and society to the poor socio-economic condition. It will affect the development of the nation.

The accident rate of Kerala is the highest in the country with 15 accidents per 1,000 vehicles, which is twice that of all Indian average. Even in the biggest states in India like Uttar Pradesh, Madhya Pradesh, Gujarat, Rajasthan and Andhra Pradesh have reported far less number of accidents compared to Kerala State.<sup>[1]</sup> Road accidents are considered to be the third major cause of death in Kerala. Kerala state has nearly 3% of the country's population but it has recorded about 10% of the country's road traffic accidents. According to the causality figures recorded in major medical college hospitals in the state, nearly 70% of the head injuries are reportedly caused due to road traffic accidents.<sup>[1]</sup>

The number of persons injured in road accidents during 2011 at 511,394 were lower by 3.1% as compared with 2010 level.<sup>[2]</sup> Motor vehicle accidents in Kerala during the years 2004, 2005, 2006, 2007, 2008, 2009 and 2010 were 40312, 41220, 42365, 29316, 27930, 26424 and 26535 respectively.<sup>[1]</sup>

Around the world, almost 16,000 people die every day from all types of injuries. Injuries represent 12% of the global burden of disease, the third most important cause of overall mortality and the main cause of death among 1-40 year age groups.<sup>[3]</sup> India has one of the highest road accident rates in the world. In India there is an accident occurred in every minute and death in every 8 min. Significant variations also arise between different states of India.<sup>[4]</sup> Road accident scenario in the country is a matter of great concern, as it became a major social, economical and health problem.

Injured people often suffer physical pain and emotional anguish that is beyond any economic compensation. Permanent disability, paraplegia, quadriplegia, loss of eye sight, or brain damage, can deprive an individual of the ability to achieve even minor goals and result in dependence on others for economic support and routine physical care. Other resource costs include police, legal, fire, victim services plus cost of property damage or loss in injury incidents.<sup>[5]</sup> Injury is recognized as an important contributor to the global burden of disease<sup>[6]</sup> and initiatives in injury prevention and control are a public health priority in many countries.<sup>[7-9]</sup> Globally injuries contribute to around 10% of total deaths.<sup>[10]</sup> Several other studies suggest that injuries contribute to 13-18% of total deaths in India.<sup>[11-13]</sup> The number of accidental deaths in India is even higher than in the Western World.<sup>[14]</sup>

RTIs are included under unintentional injuries. The definition of road traffic fatality varies in different countries and is defined as "any person killed immediately or dying within 30 days as a result of an injury or accident."<sup>[15]</sup>

According to World Health Organization (WHO), RTIs are sixth leading cause of death in India with a greater share of hospitalizations, deaths, disabilities and socio economic losses in young and middle age populations.<sup>[16]</sup> The study aimed to find the type of injuries and case fatality rate of patients admitted with road traffic accidents from 1<sup>st</sup> April 2005 to 31<sup>st</sup> March 2010 in a tertiary care hospital.

## MATERIALS AND METHODS

### Ethics

Data collected from the registers maintained in the Medical Records Department of the Medical College Hospital situated in Ernakulam district of Kerala in India. The study was done with the permission of Institutional Ethics Committee.

### Study design

#### Selection of description of participants

It is a retrospective study design. The study population consists of all patients admitted in a tertiary care level due to data collected from the registers maintained in the medical records department. Medical record department follows the guidelines of International Classification of Diseases (ICD)-10 coding.<sup>[17]</sup>

### Statistics

Z test is applied for the comparison of proportions. If  $P$  value  $\leq 0.05$  indicates that there is significance difference between the proportions of two groups. Microsoft excel was used for the analyzing the data. The data were collected according to the ICD-10 coding.

## RESULT

Total number of road traffic accident cases reported in a tertiary care hospital during the period from 1<sup>st</sup> April 2005 to 31<sup>st</sup> March 2010 was 7,660. Out of these cases 6,362 (83.1%) were males and 1,298 (16.9%) were females.

Most of the cases were occurred in the age group of 15-44 years. Among this age group 30% cases were occurred in the age group 15-24 years, 38.6% of cases were occurred in the age group of 25-34 years and 31.5% cases were occurred in the age group of 35-44 years. In the age group of 15-44 years, the highest road traffic accident cases were reported in the age group of 25-34 years during this period.

Proportion of road traffic accident cases were more among females than males in the age groups of 0-14 years and above 44 years. But the proportion of road traffic accident cases were more among males than females in the age group of 15-34 years. But road traffic accident cases were similar in both sexes in the age group of 35-44 years Table 1. Most of the road traffic accident cases 1931 (25%) and deaths 67

(26.9%) were reported in the same year, 1<sup>st</sup> April 2006-31<sup>st</sup> March 2007 Figure 1.

Total deaths occurred due to road traffic accident was 249. Out of these deaths 35 (14.06%) were females and 214 (85.94%) were males. Male deaths were more than females. Case fatality rate of diseases due to road traffic accident was 3.25% (249) of patients admitted with RTIs. Fatality rate of diseases due to road traffic accidents among males was 3.8% (214) higher than females 2.7% (35) ( $P = 0.015$ ). Most of the deaths were occurred in the age group of 15-44 years. Among the deaths due to road traffic accidents 106 (42.57%) were occurred in the age group of 15-44 years. Of the deaths 12 (4.82%) were children in the age group of 0-14 years, 60 (24.1%) of deaths were occurred in the age group of 45-59 and 71 (28.5%) of deaths were in the age group  $\geq 60$  years.

In Table 2, the types of road traffic accidents are mentioned in column 1 as per the ICD coding.

Motor cycle rider injured in road traffic accident was more to other type of road traffic accident cases except other land transport accidents ( $V_{80}$ - $V_{89}$ ) during the period from 2005 to 2010. The proportion motor cycle rider accident cases among males 4.2% and females 4.7% were similar ( $P = 0.8$ ). Pedestrian injured in road traffic accident cases were more in females 1.2% than males 0.4% ( $P = 0.005$ ) Table 2.

Of the total deaths, most of the deaths happened almost equal in motor cycle rider injured in road traffic accidents and pedestrian injured in road traffic accidents. Deaths happened in motor cycle rider injured in road traffic accidents and pedestrian injured in road traffic accidents were 9 (3.6%) and 10 (4%) respectively. These deaths were higher than other deaths except deaths due to other land transport accidents. From these results concluded that most of the cases and deaths were occurred in the motor cycle riders except other land transport accident cases.

Head injuries and neck injuries were reported among the total road traffic accident cases was 61.2% (4686) and 1.1% (81) respectively. Of the head injuries, 3782 (60.9) were males and 814 (62.7%) were females. Proportion of Head injuries occurred in both sexes are similar ( $P = 0.22$ ).

Head injuries are more occurred among the road traffic accident cases.

In Table 3 the type of injuries specified in column 1 as per ICD coding.

Within the 3<sup>rd</sup> column number of cases and in bracket percentage of cases among the total males is given. And in the 4<sup>th</sup> column number of cases and in bracket percentage of cases among the total females is also given. The unit of analysis is injury so that a person with multiple injuries may be counted more than once. Proportion of superficial head injuries and superficial abdomen, lower back and pelvis injuries were more in females than males. Proportions of superficial hip, thigh injuries were similar in both sexes. Proportion of skull and facial bone fractures were more in male than females. Proportion of lumbar, spine and pelvis fractures were more in female than males. Proportion of dislocation, sprain, strain of joint and ligaments of Head, of Lumbar, spine and pelvis and of hip were similar in both sexes Table 3.

Of the total cases, 1422 (18.56%) were superficial injuries. Proportion of superficial injuries was similar in both sexes ( $P > 0.05$ ). Among the total cases, 3271 (42.7%) fractures were occurred. Proportion of fractures was more in males than females ( $P < 0.001$ ). Of the total cases 202 (2.6%)

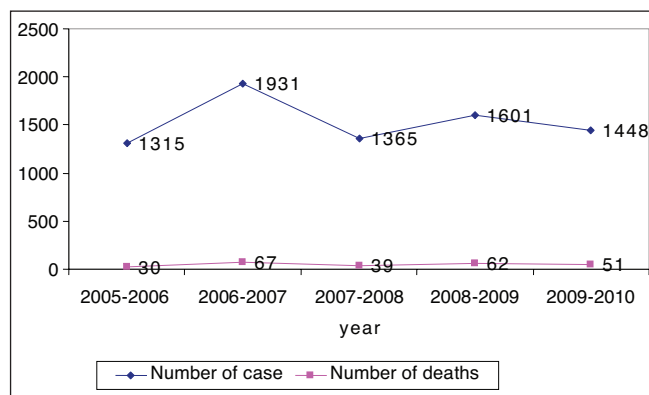


Figure 1: Road traffic accidents cases and Deaths were reported in a Tertiary Care Hospital during the period from 1<sup>st</sup> April 2005 to 31<sup>st</sup> March 2010

Table 1: Age sex distribution of road traffic accident cases reported in a tertiary care level during the period from 1<sup>st</sup> April 2005-31<sup>st</sup> March 2010

Age group (in years)	Male (%)	Female (%)	Total	Percentage	P value
<5	137 (2.15)	75 (5.78)	212	2.8	<0.001
5-14	475 (7.47)	186 (14.33)	661	8.6	<0.001
15-24	1255 (19.73)	121 (9.32)	1376	18	<0.001
25-34	1612 (25.34)	166 (12.79)	1778	23.2	<0.001
35-44	1189 (18.69)	263 (20.26)	1452	19	0.1970
45-54	872 (13.71)	218 (16.8)	1090	14.2	0.0029
55-64	479 (7.53)	137 (10.55)	616	8	<0.001
65-74	236 (3.71)	90 (6.93)	326	4.3	<0.001
$\geq 75$	107 (1.68)	42 (3.24)	149	1.9	0.0013
Total	6362	1298	7660	100	—

**Table 2: Types of road traffic accident cases reported at a tertiary care level during the period from 1<sup>st</sup> April 2005-31<sup>st</sup> March 2010**

Types of road traffic accident cases	Sex		Total	%
	Male	Female		
Pedestrian injured ( $V_{01}-V_{09}$ )	25	15	40	0.52
Pedal cyclist injured ( $V_{10}-V_{19}$ )	163	33	196	2.5
Motor cycle rider injured ( $V_{20}-V_{29}$ )	268	61	329	4.3
Occupant of three-wheeled motor vehicle injured ( $V_{30}-V_{39}$ )	5	0	5	0.06
Car occupant injured ( $V_{40}-V_{49}$ )	4	1	5	0.06
Occupant of pick-up truck or van injured ( $V_{50}-V_{59}$ )	1	1	2	0.03
Occupant of heavy transport vehicle injured ( $V_{60}-V_{69}$ )	3	0	3	0.04
Other land transport accidents ( $V_{80}-V_{89}$ )	5892	1187	7079	92.42
Total	6362	1298	7660	100

**Table 3: Types of injuries due to road traffic accidents during period from 1<sup>st</sup> April 2005-31<sup>st</sup> March 2010 in a tertiary care hospital**

Type of injuries	Male (%)	Female (%)	Total	%	P value
Superficial injuries					
Head ( $S_{00}$ )	386 (6.1)	103 (7.9)	489	6.4	0.0139
Abdomen, lower back and pelvis ( $S_{30}$ )	36 (0.6)	17 (1.3)	53	0.7	0.017
Hip, thigh ( $S_{70}$ )	35 (0.6)	13 (1)	48	0.6	0.0808
Lower limb level un specified ( $T_{13,0}$ )	2 (0.03)	0	2	0.03	
Fracture					
Skull and facial bones ( $S_{02}$ )	1334 (21)	169 (13)	1503	19.5	<0.001
Rib, sternum and thoracic spine ( $S_{22}$ )	247 (3.9)	44 (3.4)	291	3.8	0.3634
Lumbar spine and pelvis ( $S_{32}$ )	88 (1.4)	27 (2.1)	115	1.5	0.0475
Dislocation, sprain, strain of joint and ligaments					
Head ( $S_{03}$ )	9 (0.14)	1 (0.08)	10	0.13	0.5028
Lumbar, spine and pelvis ( $S_{33}$ )	8 (0.13)	3 (0.23)	11	0.14	0.4478
Hip ( $S_{73}$ )	12 (0.19)	1 (0.08)	13	0.17	0.2670

dislocations were reported. Proportion of dislocation was similar in both sexes ( $P > 0.05$ ).

## DISCUSSION

Some of the important risks of road traffic accidents are growing number of motor vehicles, increase in speed, alcohol consumption of drivers, if the driver is fatigued fast vehicles or deprived of sleep and use of mobile phones.<sup>[18]</sup> However, majority of the road traffic accidents are preventable.

RTIs are one of the leading causes of death in India and World. In developing countries larger proportion of vehicles involved in accidents are two wheelers and in developed countries four wheelers are more frequently involved in the accidents.

Injury is recognized as an important contributor to the global burden of disease<sup>[6]</sup> and initiatives in injury prevention and control are a public health priority in many countries.<sup>[7-9]</sup> Globally injuries contribute to around 10% of total deaths.<sup>[10]</sup> Several other studies suggest that injuries contribute to 13-18% of total deaths in India.<sup>[11-13]</sup> The number of accidental deaths in India is even higher than in the western world.<sup>[14]</sup>

The definition of road traffic fatality varies in different countries and is defined as “any person killed immediately or dying within 30 days as a result of an injury or accident.”<sup>[6]</sup> According to WHO, RTIs are sixth leading cause of death in India with a greater share of hospitalizations, deaths, disabilities and socio economic losses in young and middle age populations.<sup>[16]</sup>

Globally 5.1 million deaths were occurred due to injuries; out of this more than one fourth are estimated to South-East Asia Region. RTIs is the primary cause of disease among children in the age group of 5-14 years and is the third leading cause of disease among children in the age group of 15-29 years in the year 2000.<sup>[17]</sup>

The state of Kerala has nearly 3% of the country’s population but it has recorded about 10% of the country’s road traffic accidents. Over 85,000 people are killed annually in our country, where as in the United States, <42,000 people are killed in traffic crashes. The National Transportation Planning and Research Centre study shows that Kerala is the second most road traffic accident — pronestate in the country. Road density in Kerala is about four times the national average. The high density makes the traffic highly crowded and

often lead to several accidents. A study conducted by the alcohol and drug in formation-India revealed that around 40% of the road accidents have occurred due to the alcohol consumption of drivers at the time of driving. The number of road accidents in Kerala has a close relation to per capita alcohol consumption. Kerala has one of the highest per capita consumption of alcohol in the country.<sup>[7]</sup>

RTIs were the ninth leading causes of deaths in the world. In the developed regions, 57% of male deaths and 43% of female deaths in the age group of 10-24 years are due to injuries, mainly road traffic accidents and drowning.<sup>[8]</sup> Number of deaths due to road traffic accidents in Kerala from 2000 to 2008 was 2710, 2674, 2792, 2905, 3059, 3203, 3589, 3778, 3901, respectively.<sup>[19]</sup> In 2007, only 15% of the victims were females. Children aged 14 years and younger comprise only 6% of the fatalities, though their share in the population is 32%. The proportion of fatalities in the age groups 15-29 and greater than 60 years is similar to their representation in the population, but the middle-age groups 30-44 and 45-59 are over represented by about 70%. The low representation of children (2 fatalities/100,000 persons) is curious because a significant number of children walk and bicycle to school unescorted, both in urban and rural areas.<sup>[10]</sup>

In 2002, the global rate of deaths from RTIs was about 19/100,000 people. The rate was 27.6/100,000 for males and 10.4/100,000 for females. Adults aged 15-44 years account for more than 50% of deaths and more than 1.8 lakhs children under 15 years of age die in road accidents.<sup>[11]</sup> National Crime Records Bureau (NCRB), government of India reported that deaths and injuries increased by nearly 2 (50700-98254) and 4 times (109100-465282) during the period 1991-2005 respectively.<sup>[12]</sup> RTIs figure prominently as a major cause of death in national surveys also.

The survey of cause of death<sup>[13]</sup> revealed that 2.6% of total and 21% of injury deaths were due to transport injuries occupying tenth place in the overall ranking. The Medical Certification of cause of death survey reported that road deaths constituted 1.5% of total and 16% of injury deaths.<sup>[20]</sup> In a global review of RTIs observed that 30-80% of hospital admissions are due to RTIs.<sup>[21]</sup> Limited studies in India revealed that 20-50% of emergency room registrations and 10-30% of admissions are due to RTIs.<sup>[22-28]</sup> A Nigerian study reported that of the road traffic accidents 72.4% were males and 27.6% were females.<sup>[29]</sup> In the present study identified that among the road traffic accident cases 83.1% were males and 16.9% were females. The Nigerian study result and the present study reported the similar result that road traffic accidents were more in males than females.

A study reported that 40% of deaths were due to RTIs.<sup>[30]</sup> Death rate in India in the year 2005 was 90/million population. In Kerala it was 96/million population.<sup>[31]</sup> Road traffic accident deaths in India in the years 2005, 2006 and 2007 are 98254, 105725 and 114590 respectively. In

the present study showed that case fatality rate of diseases due to road traffic accident was 3.25%, case fatality among males was (3.8%) higher than females (2.7%). Road traffic accident deaths occurred among the hospitalized patients in the years 2005-2006, 2006-2007 and 2007-2008 in the present study was 30, 67 and 39 respectively. All national reports and independent studies conclusively point out that men are killed and injured in greater numbers with male to female ratios varying from 4:1 to 5:1. In the present study also found that road traffic accident cases and deaths were more occurred in males than females.

RTIs are one among the three leading causes of death and disability in the economically productive age group of 15-44 years. According to NCRB report of 2005<sup>[12]</sup> mentioned that 64.3% of deaths occurred in the age group of 15-44 years, with children and the elderly accounting for 6.4% and 8.2% of deaths respectively. In the present study most of the deaths were occurred in the age group of 15-44 years. Among the deaths due to road traffic accidents 42.57% were come in to the age group of 15-44 years. It revealed that most of the deaths were come in the economically productive age group. One of the Indian study emphasized that nearly 80% of those killed in Delhi and Mumbai belong to the group of vulnerable road users.<sup>[32]</sup> In the present study mentioned that of the road traffic accident deaths, 4.82% were children in the age group of 0-14 years, 24.1% were in the age group of 45-59 and 28.5% were in the age group  $\geq 60$  years.

A study reported that 60-70% of hospitalized traumatic brain injuries are due to RTIs.<sup>[22,24]</sup> According to the causality figures recorded in major medical college hospitals in the state, nearly 70% of the head injuries are reported due to traffic crashes. Brain injuries are extremely common among RTI subjects.<sup>[24,25]</sup> Few studies from India have documented the extent of injuries to the head, face, upper and lower limbs. Fractures of the upper and lower limbs have been documented in 18-20% of RTI patients.<sup>[24-27]</sup> A study conducted in Delhi reported that 11.2% head injuries and 1.9% neck injuries were occurred in RTIs.<sup>[33]</sup> In the present study, 61.2% head injuries and 1.1% neck injuries were occurred in the RTIs. In the present study result head injuries were very high compared to the study result in Delhi. Proportion of Head injuries occurred in both sexes are similar.

A study report mentioned that road traffic accident is the most common cause of fracture and dislocation.<sup>[34,35]</sup> A study result in Delhi mentioned that 47.4% superficial injuries and 20.7% fractures were occurred due to road traffic accident.<sup>[33]</sup> In the present study showed that 18.56% superficial injuries and 42.7% fractures were occurred due to road traffic accident. The present study mentioned that fractures were more occurred than superficial injuries but the study result in Delhi mentioned that superficial injuries were more than fractures. In Delhi most of the roads are highway it may be the reason for superficial injuries were more occurred in Delhi due to the road traffic accidents.



In many countries, motor vehicle accidents are first among all fatal accidents. During the year 2002 there were almost 1.19 million deaths from road traffic accidents in the world.<sup>[36]</sup>

Motor vehicle crashes are the leading cause of death in adolescents and young adults<sup>[37]</sup> and of the estimated 856,000 road deaths occurring annually worldwide, 745 are in developing countries.<sup>[38]</sup> Hospital based studies in Bangalore during 1993,<sup>[22]</sup> 1998,<sup>[23]</sup> and 2005,<sup>[24]</sup> have shown that pedestrians, occupants of motorized two wheelers and bicyclists are injured and killed to the extent of 25-35%, 30-40% and 7-10%, respectively. Similar results are reported in the studies from other centers in India<sup>[25,26,28,38]</sup> and also from population-based surveys.<sup>[39-44]</sup> In the present study showed that motor cycle rider injured in road traffic accident was 4.3% and pedestrians injured in 0.52%. Deaths of motor cycle riders (3.6%) and pedestrians (4%) in the road traffic accidents were almost same in the present study.

## CONCLUSION

Road traffic accident cases are one of the leading causes of morbidity and mortality. Condition of the road, driver's carelessness, alcohol consumption and mobile phone use at the time of driving etc., are the factors influencing road traffic accidents. Most of the victims of road traffic accident will suffer physically, mentally and economically in their future. This will affect the development of the Nation. Immediate changes will be necessary for reducing the road traffic accidents. To reduce the road traffic accidents by conducting public awareness program and stricte for cement of traffic rules. An intensive road safety Campaign should be organized throughout the state by all concerned departments. Each road safety Campaign should be further divided into various target groups like non-governmental organizations, academic maybe entrusted with this task, with adequate funds to carry out this in a sustained manner for reducing the road traffic accidents.

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