

## RESEARCH ARTICLE

# CIRCUMSTANCES OF FATAL ROAD TRAFFIC ACCIDENTS AMONG ADOLESCENTS IN A METRO CITY OF INDIA

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## ABSTRACT

Road Traffic Accident (RTA) is an important public health problem globally in all age groups, particularly among adolescents. RTA is one of the leading causes of death in India. The long-term impact of RTA among adolescents is serious in society in terms of economy, disease burden, and future productivity.

This study attempts to find out the circumstances of fatal road traffic accidents among adolescents in a metro city in India.

This is an observational descriptive cross-sectional study, conducted at an autopsy center in Kolkata, India for a period of one year. Data were obtained from reports of post-mortem examinations and police inquests of fatal road traffic accidents in adolescents, reported to the institute. The data was compiled in Microsoft Excel and analysed by using a simple table.

The total number of RTA deaths among adolescents during the study period was 45, with 91% of them male and 9% female. The most common offending vehicle in RTA deaths was a motorized two-wheeler (71%). 91% of the deceased were riders while 9% were pillion riders. 59% of them were below the age (18 years) of obtaining a valid driving license. The majority had collided with stationary objects during the RTA and died due to head injury (52%).

**Keywords:** Adolescent; Fatal; Rider; Road traffic accident; Two-wheelers

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## INTRODUCTION

Road Traffic Accident (RTA) is a serious public health problem worldwide. The “Study Global Burden of Disease” commenced by the World Health Organization, Harvard University, and World Bank, forecasted that the world’s third biggest cause of death and disability would be due to traffic accidents by the year 2020<sup>1-3</sup>. Nowadays injuries and deaths occurring from road traffic crashes are unacceptably high. The current trend indicates that this situation will continue in the near future<sup>4</sup>. The lives lost due to road traffic accidents kept on

increasing to reach as high as 1.35 million in 2016<sup>4</sup>. The situation is not distributed uniformly over the globe. In low-income countries, RTA is the 7<sup>th</sup> leading cause of death, while in lower and upper-middle-income countries, it ranks 10<sup>th</sup>. But in high-income countries, RTA does not rank in the top 10 leading causes of death<sup>5</sup>. If we investigate the deaths among adolescents worldwide, we find that in 2019 alone, RTAs claimed nearly 100,000 lives in the adolescent age group (10-19 years). Many of the deceased were pedestrians, cyclists, or users of motorized two-wheeler<sup>6</sup>. Iran has the highest rate of road accidents in the world<sup>7</sup>, whereas China is in the second highest position in the world<sup>2</sup>. In India, one person dies every 6 minutes, and 10 are injured at the same time frame<sup>2</sup>. India leads in the number of deaths due to RTA followed by China and US among 199 countries reported in the World Road Statistics, 2018<sup>4</sup>. As per the WHO Global Report on Road Safety<sup>4</sup>, India accounts for almost 11% of the accident-related deaths in the World. In India during the year 2019, nearly 30% of the victims of RTA were of the age of 25 years and below<sup>8</sup>. In their report on Adolescent and young adult health, WHO advocates the necessity of advising young drivers on safe driving. They also suggest strict enforcement of laws against driving under the influence of alcohol and drugs among all age groups<sup>6</sup>. People in the adolescent age group are the most potentially productive segment of the society and their loss is costly. For every individual killed in RTA, many others are requiring long treatment and rehabilitation leading to a serious loss of productivity. In this perspective "Circumstances of fatal road traffic accidents among adolescents in a metro city of India" has been planned and executed in the Department of Forensic and State Medicine, Institute of Post Graduate Medical Education and Research (IPGME&R), Kolkata, West Bengal, India.

## METHODOLOGY

This was an observational descriptive cross-sectional study, with institution-based data collection. The study was conducted at the autopsy center of the Department of Forensic and State Medicine, Institute of Post Graduate Medical Education and Research (IPGME&R), Kolkata, West Bengal, India, during a period of one year (1<sup>st</sup> January 2021 to 31<sup>st</sup> December 2021). The research activity included obtaining permission, anonymous data collection, compilation, analysis, and write-up. The study population consisted of adolescents who died due to road traffic accidents as reported in the autopsy center of IPGME&R, Kolkata. The sample size was a complete enumeration. During the study period, a total of 2686 post-mortem examinations were

conducted in this autopsy center. Among them, 143 deceased were in the adolescent age group, of which 45 were fatally injured in RTA. They constituted the population of this study. The percentage prevalence of fatal RTA in India among the 10-19 years age group (adolescent age group as per WHO) is not available. This made it difficult to calculate the sample size. Therefore, complete enumeration was done.

IPGME&R, Kolkata is an apex hospital providing tertiary-level health care. There is no territorial demarcation for referral service to this hospital. So, the population served by the apex hospital cannot be defined.

Ethical clearance was obtained from the competent authority after ensuring that the data collection would be anonymous, no photographs taken, or any data procured which could reveal the identity of the deceased.

Data was obtained from police inquests and post-mortem reports of the study population. The data was compiled in Microsoft Excel and analysed by using a simple table.

## RESULTS

During the study period, post-mortem examinations of 143 deceased adolescents were conducted. As revealed on initial police inquiry, the manner of death among 45 of them i.e., 31%, was RTA followed by hanging and burns (15% each) and poisoning (10%). Among the 45 deceased adolescents who died due to RTA (study population), 91% were male subjects.

The vehicles involved in the fatal RTAs included in the study are demonstrated in Table 1.

**Table 1: Vehicle involved in the RTA**

Road-user category	Frequency	%
Users of two-wheelers	32	71
Bicyclist	6	13
Pedestrian	5	11
Users of four-wheelers	2	5
Total	45	100

Considering deaths involving two-wheelers, 91% were drivers, while 9% were pillion riders.

The minimum age to acquire a driving license for any motorized vehicle is 18 years in India. In this study population, 59% of the fatally injured adolescent

two-wheeler riders were below the legal age for getting a driving license (< 18 years).

The colliding surfaces during the fatal RTAs are demonstrated in Table 2.

**Table 2: Colliding surfaces during the RTA**

Object deceased collided with	Frequency	%
Stationary object	15	52
Four-wheeler	07	24
Motorized two-wheeler	03	10
Engine van*	03	10
Pedal bicycle	01	4
Total	29	100

\*Engine van: Locally-built three-wheelers fitted with an engine without safety and pollution certification as well as license and registration number

The majority of vehicles had collided with a stationary object and in 94% of cases, the cause of death was the death due to head injury (Table 3).

**Table 3: Distribution of injuries in RTA**

Distribution of injuries	Frequency	%
Head Injury	42	94
Abdominopelvic injury	01	02
Vertebra and spinal cord injury	01	02
Fracture of long bone	01	02

## DISCUSSION

WHO in their Global Status Report in Road Safety<sup>4</sup>, said that nowadays the foremost cause of death of children and young adults (5-29 years) is road traffic injury which is largely due to neglected road safety. This indicates a need for a shift in the current child health agenda. This relationship is even stronger when it focuses on motorcyclists who, since the age of 15, are already 85.5% of the victims, reaching 91% between 20 and 24 years<sup>9</sup>. In our study it was found that RTA is the leading cause of unnatural deaths among adolescents (31%), corroborating the findings of WHO.

Data from the U.S. Department of Transportation's Fatality Analysis Reporting System (FARS) reveals that about 2 of every 3 teenagers killed in crashes in 2019 were males<sup>10</sup>. Anantharaman and

Logaraj<sup>11</sup> accounted that most of the victims of RTA in Chennai were young males in the productive age group with a male-to-female ratio of 6:1. Government of India, Ministry of Road Transport and Highways Transport Research Wing New Delhi, reported in the year 2019 that 1,51,113 persons died due to RTA. Among them, 11168 (7.4%) were below 18 years of age and 77.5% of them were male. This high incidence of deaths among males was consistently found in India and its different states in the past years. In West Bengal, the state of India where the study was conducted, among the deceased of fatal RTAs, 67% were male and 33% were female<sup>12</sup>. These findings agreed with our study (male 91%; female 9%).

The growing trend of RTA is significantly observed in countries experiencing rapid growth in population, urbanization, and motorization<sup>4,13</sup>. According to the Government of India, Ministry of Road Transport & Highways Transport Research Wing<sup>8</sup>, among fatal RTAs 43.2% involved two-wheelers, 17.8% pedestrians, and only 13.6% involved other four-wheelers<sup>14</sup>. It was stated that motorized two-wheeler occupants meeting with RTAs were more common in the younger age groups in Haryana. On analysis of the type of vehicle, Anantharaman and Logaraj<sup>11</sup> showed that 43.02 % of the vehicles were light motor vehicles in Chennai. In West Bengal, 20.6% of the deceased of RTA were users of motorized two-wheelers<sup>12</sup>. These studies positively reflect our observations.

In this study, the deaths from RTA involving motorized two-wheelers affect mostly drivers (91%) in comparison to the pillion riders (9%). In India as well as in West Bengal the legal age of obtaining a license for driving motorized vehicles (two-wheeler as well as four-wheeler) is 18 years. Here 9.9% of the drivers involved in RTA did not have a valid license<sup>8</sup> but in our study among the adolescent age group, it was observed that 59% of the drivers of two-wheelers involved in fatal RTAs were below the legal age and did not have a valid driving license. Furthermore, in the remaining 41% of cases, sufficient data was not available to confirm whether they possessed a valid driving license or not.

In RTAs when the responsible vehicle is a two-wheeler, the victim/victim-vehicle is a pedestrian in 27% of cases and a bicycle in 22%, and a two-wheeler in 34% of cases. In our study when the responsible vehicle was a two-wheeler driven by an individual in the adolescent age group, the victim/victim-vehicle was noted to be a four-wheeler in 24% of cases and a two-wheeler in 10%, engine van in 10% and bicycle in 4% of cases. But, in

52% of the cases, the rider collided with a stationary object resulting in the death of the rider.

Head injury is the major cause of death due to RTA by motorized two-wheeler users. The most important safety measure is a properly worn standard crash helmet. In this study, 94% of the two-wheeler riders died due to head injury. Alcohol and drug abuse is another major risk factor of RTA. Wearing crash helmets is mandatory for two-wheeler users and consumption of alcohol and drugs is completely prohibited during driving. In this study, data is not available on whether the deceased wore a crash helmet and whether they were under the influence of alcohol and drugs or not.

## CONCLUSION

This study reveals that RTA is the major cause of unnatural deaths among adolescents in India. In this age group, the majority of RTA fatalities were males riding motorized two-wheelers and below the age (18 years) of obtaining a valid driving license. The majority of them had collided with a stationary object and died due to head injury.

Ministry of Transport and Road Safety, Govt of West Bengal has launched a road safety initiative "Safe Drive and Save Life". In this initiative, awareness weeks have been conducted at regular intervals involving people of all age groups. Refuelling pumps are instructed not to dispense fuel if the riders are not wearing helmets. Multiple strategies have been implemented, such as the capacity building of relevant personnel, institutional strengthening through procurement of road violation detection devices, conducting periodic examinations of roads through road safety audits, development of medical care facilities (well-equipped trauma care center), and procurement of ambulance with resuscitation facility. The effectiveness of these initiatives needs to be evaluated.

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None

## CONFLICTS OF INTEREST

There are no conflicts of interest.

## ETHICAL ISSUES

Ethical clearance was obtained from the IPGME&R Research Oversight Committee, Institute of Post Graduate Medical Education & Research, Kolkata, India

## SOURCES OF SUPPORT

None

## AUTHOR CONTRIBUTIONS

**ID:** Acquisition and analysis of data for the work; **KB:** Development of content; **NB:** Data processing, compilation, and analysis; **DM:** Data processing, compilation, and analysis; **SC:** Interpretation, drafting, and revising the paper critically for important intellectual of data for the work.

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