

How and Why of Road Traffic Accidents

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ABBREVIATIONS

NIMHANS	- National Institute of Mental Health and Neuro Sciences
NCRB	- National Crimes record Bureau.
RTIs	- Road Traffic Injuries
RTA	- Road Traffic Accidents
SCD	- Survey Of Causes Of Death
WHO	- World Health Organization.
MCD	- Muncipal Corporation Of Delhi.
JIPMER	- Jawaharlal Institute Of Post Graduate Medical Education and Research.
SDH	- Sunsari district hospital
US	- United States
SEAR	- South East Asian Region
BPKIHS	- B.P.Koirala Institute Of Health Sciences.
VRUs	- Vulnerable Road Users

INTRODUCTION

INTRODUCTION

Spectacular advances made in health & health related sciences have paid with dividends in bringing down the mortality and morbidity due to communicable diseases. This has resulted in longevity of the people. At the same time Globalization has improved the socio economic status of the people resulting in changes in the life style of the people. The longevity of life and changes in the life styles has brought the entire spectrum of non-communicable disease and accidents to the forefront of health care delivery system.

Road traffic accidents (RTA) are increasing in an alarming ways. Globally nearly 1.2 million people killed in RTA during the year 2002. Developing and underdeveloped countries accounted for 80% of these deaths. RTA accounts for 2.1% of total deaths and 21% of total injury. Projected estimations reveals that fatalities due to RTA will increase by 66% over the next 20 years and will be the 3rd leading cause of death by 2020 moving from its present 9th position¹

In India every year RTA accounts for over 1,00,000 deaths, 2 million hospitalization, 7.7 million minor injuries and an estimated loss of 55,000 crores or nearly 3% of the GDP every year. If the present scenario is continued, it is projected that deaths due to RTAs will be 1,50,000 and 2.8 million victims will be hospitalized by 2010. 1, 85,000 deaths and 3.6million victims will be hospitalized by 2015. The social and psychological suffering of the injured persons is increased and their families and also families with RTA deaths are phenomenal. It is sad to note that life saved due to advancements in health and health related sector is now being wasted on the roads.¹

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The major causes for RTAs in our country are, rapid increase in personalized modes of transport, a mixture of slow and fast moving vehicles, lack of road discipline, drunken driving and use of mobile phones while driving.²

Since most of these causes are preventable, in order to create awareness, WHO's theme for 2004 was "ROAD SAFETY IS NO ACCIDENT". The timely quality care provided to the victims will definitely alleviate their pain and limit the disability associated with accident.³

As Bijapur is one of the fast urbanizing city of Karnataka State, this study was undertaken to document the socio-demographic profile of the injured victims and the medical care provided to them.

LITERATURE REVIEW

Currently trends in population, industrialization and urbanization are putting heavy pressures on transport networks in general and on road system in particular.

"Man drives as he lives". A terrible penalty of mortality has already been paid as a cost of integrating motor vehicles into modern life.

A WHO advisory group in 1956 has defined accident as "an unpremeditated event resulting in recognizable damage" According to another definition, an accident is that "Occurrence in sequence of events which usually produces unintended injury death or property damage"⁴

The term injury is derived from the Latin term "Injuries" meaning "not right". According to William Haddon, the first director of the new highway traffic safety administration in US an injury is defined as "damage to the body caused by an exchange with environmental energy that is beyond the body's resilience."⁵

WHO defines an injury as a "damage which results in the persons concerned seeking health care, needing hospitalization for specific period of time, or losing their ability to perform their usual activities for stated period, usually a minimum of one day but sometimes longer."⁶

Burden of injuries:

Globally, injuries result in death of 16,000 people everyday and rank third in overall mortality. Injury is the leading cause of death in productive age group. As per WHO estimates that 5 million persons lost their lives in the year 2002 due to an injury, contributing for 10% of total deaths.¹

National studies: In National studies useful statistics is given by relating number of deaths, no of injured and no. of vehicles.

- Total includes deaths, injuries and total motor vehicles from 7 union territories (n=2139)

Among 28 states of India ,RTI mortality rate/1,00,000 population varied from as low as 1 in Haryana to as high as 18 in Goa, with national average of 8/1,00,000. The states of Andhra pradesh, Karnataka, Maharshttra, Himachal pradesh, Kerala, Tamilnadu and Rajasthan had higher than national average of 8/1,00,000 as shown in table 1. Interestingly these are some of progressive states being high on various indicators of growth and development in health, literacy, economy transport and motorization.¹

Data for major Indian cities reveals that mean mortality and incidence of RTIs was 12 and 58/100,000 population with ratio 1:5 as shown in table 2. Bangalore, Indore, Jaipur and Kanpur had rates higher than national rates. kolkata and Mumbai had lower rates probably due to more vehicles and low average traffic speed.¹

Using constant increase method (assuming that RTIs will increase as at present without any changes) with 5% increase every year and under reporting factor of 10% for deaths, it is estimated that 1,10,300 persons lost their lives, 2.2 million were hospitalized and 5.5 million received care for minor injuries during the year 2005. This might increase to 1,32,470 deaths and 2.7 million hospitalization by 2010 and 1,54,640 deaths and 3.1 million hospitalization by 2015.¹

Applying progressive increase method with an annual increase of 5% and under reporting correcting factor of 10%, 1,12,478 deaths, 2.5 million hospitalization along with 5.6 million persons with minor injuries in 2005. Deaths would increase from this number to 1,43,554 deaths and

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2.8million hospitalization by 2010 and 1,83,216 deaths and 3.6 million hospitalization registration by 2015.¹

HISTORICAL ASPECTS:

Johann Frank (1788) generally considered to be the father of Public Health devoted considerable attention to the subject of accidents as a problem that both deserves high priority and is amenable to public methods.⁷

The world first death by motor vehicle happened on 17th August 1896, Bridget Driscoll, a 44 year old mother of two, became the first ever killed by a motor vehicle. She was struck by a car as they crossed the palace grounds in London. Witness said that car was going at “Tremendous speed” 8 miles/hr.

At the inquest, the coroner said “This must never happen again”.

The first motor car accident in Britain resulting in death of the driver occurred in Groove Hill, Harrow-on-the Hill on 25th February 1899.⁸

Legislative provisions to control accidents were evolved, in 1910.⁹

The first traffic light of the world was installed in Detroit, USA in 1919. The first traffic light in Britain was installed in Wolver Hampton during 1928. However they did not come to London till 1932.

Godfrey in 1937 categorized accident prevention as a public health necessity.

Gorden (1949) gave an epidemiological approach to the study of road accident and stated that, (1) Different groups of the population are affected differently by such accidents as they are by disease. (2) Accidents also differ in their geographic location tending to occur more frequently at certain sites. This may be designated as “black spots”. (3) Accidents differ in incidence between urban and rural areas and (4) The incidents of road traffic accidents also varies with such environmental factors as time of the day, day of the week, weather conditions, type of road design and surface, lighting and visibility.¹⁰

Tillman and Hobbs (1949) and Conger et al (1959) have shown that high and low accident groups differed markedly in their personality characteristics. High accident group showed marked intolerance for, and aggression against any authority, dating from early childhood.¹¹

Selzer (1968) showed that alcohol was a major problem in single vehicle fatal accidents. In 72 fatal accidents which claimed 87 lives, he showed that half of drivers had serious drinking problems of chronic nature.¹²

Alvarez and Coller (1977) mentioned that many of the reported accidents were due to defective social behavior.

In a study (1978), following conclusions were drawn.

1. Human error was responsible for 68% accidents.
2. Adverse environment was responsible for 26 % and
3. Vehicle defects were responsible for 8 % of total accidents.

It was then mentioned (1982) that, increased risk of traffic accidents was incurred by children, old people and the handicapped.¹³

Further studies showed a wide difference of opinion about the routine medical examination of drivers as screening procedure. Numerous studies have shown that medical factors (apart from the effects of alcohol) appeared to play relatively minor role in the causation of injury producing road accidents. Considerable attention has again been paid to the study of psychological and sociological factors that might influence adversely the behavior of road users⁹

Women police were employed for traffic control duties for the first time in Paris in 1964 and in Delhi, women traffic police was introduced in 1989.⁸

In a study done in Darbhanga Medical college from January 1973 to June 1976, in Darbhanga, it was observed that motor truck was responsible for the maximum number of accidents followed by other vehicles such as buses, cars etc. The male to female ratio was 3:1. The maximum fatalities (28%) were in the age group of 21-30 years and next followed by the age group 1-10 years (23%). The peak period of incidence (25%) was found to be between 8 am to 10 am followed by 6pm to 8pm (15%). The pedestrians

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(75%) outnumbered the others. Of the 100 cases studied, 50% died of run over and 42% were knocked down by various vehicles and remaining 8% died due to primary impact injuries sustained.

Head injury alone was the cause of death in 28% of cases, head injury along with abdominal injury in 18% of cases, thoraco abdominal injuries in 14% and head injury along with thoracic injury in 13% of cases. In 40% of cases the death was instantaneous.⁸

Study done in 1976 on medico legal postmortems between January 1974 to December 1976 by department of Forensic medicine, university teaching hospital, Lusaka revealed that, 630 (36%) were traffic fatalities. 516(82%) were males and 114 (18%) were females. More than half of the victims 375 (59.5%) were between 21-40 years of age. 292 (46%) were pedestrians, 121 (19%) were drivers, 173 (27%) were passengers and 44(7%) were on two wheelers. 201 (40%) accidents occurred between 6p.m. – 12 mid night and 131 (21%) between 12.00 p.m. – 06.00 p.m. 418 (66%) victims died on the spot, 18(3%) died on the way to the hospital, 89 (14.1%) died within 24 hours of accident and 38 (6.0%) died within 48 hours and 67 (10.6%) after 48 hours of accident. Chest injuries were seen in 407 (65%) victims and head injuries were seen in 302 (47%) fatalities, 233 (37%) had abdominal injuries, followed by 220 (35%) had injuries to the limbs. Out of 401 victims, 297 (61%) had alcohol in their blood at the time of accident. Out of 630 victims, 427 (68%) died of multiple injuries and 77 (12%) died of head injuries respectively¹⁴

A study on vehicular related fatalities among teenagers was carried out from case files of the office of medical examiner, Metro Dade County Miami, Florida, United States, between the year 1978-82. During the 5 year period a total of 1919 vehicular related fatalities were examined, of which 247 (12.9%) occurred in individuals between the ages of 13 and 19 years. Males 191 (77.3%) were more commonly involved than females 56 (22.7%) in vehicular accidents. Out of total 247 cases, alcohol was detected among 76 (30.8%) of cases, where as in 118 (47.8%) of cases alcohol was not detected. Common drugs of abuse were found in at least 16.6% of cases. In majority of cases, victims were either passengers or drivers. Pedestrians as victims were less. Only one documented case of an individual dying with a seat belt in use is noted in five years. Careless driving 63 (25.5%) was the major key factor responsible for the fatality.¹⁵

In a retrospective analysis done for a period of 10 year (1976-1985) on road traffic accident fatalities which was conducted by Department of clinical sciences and pathology, faculty of medicine, university of Papua, New Guinea. It was found that majority of the victims were males and under the age of 45. Passengers formed the largest number among the accident cases, followed by pedestrians and drivers. Most of the fatal accident cases occurred during the weekend. Analysis of injuries revealed that head injury to be dominant and possible cause of death in all three categories of victims, where as multiple injuries involving organs were more common in pedestrians than passengers and drivers.¹⁶

A two-year prospective study on injuries sustained from motor-cycle accidents, (MCA) was conducted by Department of Surgery at the University of Ilorin Teaching Hospital, Ilorin, Nigeria, in 1983 and 1984. It was found that Motor cycle accident patients constituted 10.3% of total 715 road traffic accident patients and also presented 5.7:1 male preponderance. Peak age was 18 to 30 years. Nearly 75% sustained lower extremity, chest and cranio cephalic injuries (6.8%), where as (5%) died because of motor cycle accidents.¹⁵

In a study conducted by the institute of Community Medicine, Madras Medical College in Casualty Department of Government General Hospital Madras, South India in 1990, 1906 accidental trauma cases have attended the above department during a continuous period of one month round the clock and accounted for 15.3% of the total attendance of the patient to the casualty department. Of those brought to the hospital following accidental trauma 1.8% were dead, 35.1% were due to road traffic accidents, 21.7% to household accidents and 20.9% to occupational accidents. Of these accident traumas 46.9% occurred in the age group 21-40 years. Males accounted for 80% of the patients. Injuries involving lower extremities accounted for 35.4% of the total injuries, where as head injuries accounted for 29.5%. Of the injuries, whereas 5.8% were life threatening, 7.4% severely disabling, 35.9% disabling and rest were trivial injuries.¹⁷

An epidemiological study of road traffic accident cases was conducted at Jawaharlal Institute of Post Graduate Medical Education and Research (JIPMER) Hospital, Pondicherry, South India from 1st January to 31st December 1994. The study consisted of all 726 road traffic accident victims

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reporting to the JIPMER casualty in the above one year period. It was found that, of 726 victims 603 (83%) were males and 123 (17%) were females. The highest numbers of victims (31.3%) were between 20-29 years of age followed by 30-39 years and 40-49 years age group. There were 65 (8.9%) children (8.9%) below 12 years of age with an average of 7.1 years.

Among 494 victims interviewed, 107 (21.4%) had education up to 5th class, 95 (19.3%) had educated up to 8th class, while 82 (16.6%) were illiterates. The laborers were the highest 217 (29.9%), followed by next largest group with 157 (21.6%) victims were employed in service and 115 (15.8%) students were involved and lowest was seen in unemployed group of victims were 4 (0.6%). The highest number of RTAs took place in January (12.9%) followed by August and October (9.0%) each. The highest number of RTAs (17.1%) took place on Sundays, followed by Tuesday (15.9%) and Thursday (15.8%) and least number of cases on Mondays (12.3%). The highest number of RTAs occurred from 4 pm to 5pm (8.9%) and from 6 pm to 7 pm (7.3%) respectively. Pedestrians (22%), drivers (35%) and occupants of vehicles (45%) were the category among the victims. Among the drivers of different types of vehicles, there were 98 (38.6%) bicyclists, 43 (16.9%) bullock cart drivers. Motorized two wheeler drivers were victims in 79 (31.1%) of cases, while bus and four wheeler drivers were victims in 13(5.3%) and 9(3.5%) cases respectively. Out of 245 drivers involved, 187 were interviewed. Of these 85 drivers of different motor vehicles, 71 mentioned that they had driving license, one had learner's driving license and 13 (15.3%) had no valid license. Out of 254 drivers, 38 (14.9%) were found to have consumed alcohol. The occupants of buses 150 (48%) were the highest number of victims involved in RTAs. Among the motorized two wheelers, the pillion riders of scooters were least involved.¹⁸

In a study conducted by Department of civil Engineering, Kuwait University, Safat, Kuwait, Gulf in Jan 1994, to know the impact of seat belt use on road accident injury and injury type among road accident. It was found that seat belt use had an positive effect in reducing both road traffic fatalities and multiple injuries. The use of seat belts has also affected the nature of the injuries resulting from road traffic accidents. Non-use of belts experienced higher frequencies of head, face abdominal, and limb injuries. User of belts, suffered higher frequencies of neck and chin injuries.¹⁹

A study conducted in municipality of Londrina, a medium – sized city of southern Brazil in 1996 to know the characteristics of road traffic accidents that occurred during the first semester on 1996. 3643 were victims of RTAs during the year 1996. Car or small truck collisions were the most common type of accident. The rate of motor cycle related injuries (per 1,000 registered vehicles) was seven times higher than that resulting from cars or small trucks. Fatality rates were higher for motor cyclists who collided with stationery objects (29.4%) and pedestrians who were injured by Lorries and buses (22.2%), in comparison with a mean fatality rate of 1.8%.²⁰

A study was conducted by the Traffic Medicine research Institute of Surgery, Third Military Medical University, Chonqquing, China, during the year 1997 and 1998 to know the epidemiological characteristics and preventive methods of road traffic accident. A total of 13121 road traffic crashes with 6201 crashes with casualties were analyzed. The incidence of crashes was higher in May, June and July and on Friday, and Wednesday at 8.00 a.m. – 12.00 noon and 2.00 p.m. – 6.00 p.m. within a day. Casualties were 44.0% in pedestrians and 42.% in passengers of the total casualties. Pedestrians accounted for 59.1% of total deaths and 56.4% of the total severe injuries. People over 60 years old accounted for 24.1% of the total pedestrian casualty. The age of drivers and passengers were mainly between 18-30 years, followed by 31-40 years. The main reasons for these crashes were improper driving 26.1%, inadequate following distance 11.6%, violating driving norms 9.1%, carelessness 6.1%. Head injury was the most common reason for deaths among the road traffic crashes followed by chest and back injury. Violating traffic laws by pedestrian was one of the main reasons for pedestrian casualty.²¹

In a study done on road traffic accident victims at the Nairobi hospital, Nairobi, by the Department of Human Anatomy, College of Health Sciences, Nairobi. Medical records of randomly selected road trauma patients who presented at the Accident Centre between 1st July 1997 and 31st August 1998 were analyzed. It was found that mean age was 32 years with a peak incidence in 21-30 year age group, where as Males comprised 63.1% of the injured. The predominant category of the road user injured was vehicle occupant (70%), where as pedestrians only constituted 21.3%. Major city road or highways were the commonest scenes of injury (38.3%).

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Most of the responsible vehicles were small personal cars (5.8%), where as minibuses caused 20% of the injuries.²²

A retrospective study was conducted at the emergency department of the hospital in the Comhuriyet University, Sivas, to analyze traffic accident cases. The hospital files of cases from the Emergency Department of the Hospital between 01 Jan and 31st Dec 1998, were investigated retrospectively. Of the total cases, most (44.52%) were in the 1-25 years age group, 41% were pedestrians in the accidents, 81.29% of accidents happened within the city. 44.03% occurred in the summer and 39.83% occurred at 12 noon to 6p.m. 44.5% victims reached to the hospital in the first hour. The vehicle type in 60.80% of the cases was automobile, whereas 14.28% of the cases had consumed alcohol. The blunt injuries in head, neck region accounted for 47.50% of which was present in head-neck region. 257 cases (41.45%) were hospitalized. 23 cases (3.71%) died because of road traffic accident.²³

An epidemiological study on road traffic accident cases, conducted by department of Community Medicine and Department of surgery at the SUNSARI District Hospital (SDH), Ineruwa and the B.P. Koirala Institute of Health Sciences (BPKIHS) hospital, Dharan, Eastern Nepal for a period of one year from May 1997 to April 1998. A total of 870 road traffic accident victims were reported during the period. Males are commonly affected accounting for 76.1% than females 23.9%. The highest number of victims were in the age group of 20-29 years accounting for 28.6% followed by (18.9%) in 30-39 years age group. Laborers, constituted the largest group (27.6%), followed by students (24.2%). Almost an equal percentage (23%) of victims were either illiterate or had only primary level of education, where as victims with higher education were fewer in proportion. A greater number 126 (14.5%) of accident cases were reported in the month of July followed by January. The highest number of accidents occurred on Sundays (30.5%), followed by Fridays (20.0%) respectively. Out of 212 drivers 16.9% drivers were found to have consumed alcohol 2-3 hours prior to accident. Buses (31.4%), trucks (12.3%) and bicycles (11.3%) were the commonest vehicles involved in the RTAs. The common mode of sustaining accidents was by falling down from a moving vehicle.²⁴

In a study conducted in provincial hospitals in Chon Buri, Thailand in 1999, information was reviewed from eight non referral and one referral hospital. The majority of the patients of non referral hospitals were males (71.1%), motor cyclists (84.2%), and received ambulatory care (83.9%) young patients had a higher risk of being admitted to the hospital.²⁵

In a study conducted by the Department of Human Anatomy and Surgery, College of Health sciences, University of Nairobi, Kenyatta National Hospital (KNH) in Nairobi, Kenya from 1st February 1999 to 30th April 1999 revealed that Road injury admissions formed 31% of all injury admissions. The mean age was 30 years, where as males comprised 86.4% of all patients. The proportion of patients under 20 years of age was 20% with a peak age of 20-29 years. The mean pre hospital time was 2.56 hours and the emergency department disposition time was 3.36 hours, only 17.5% reached their areas of definitive care within 60 minutes.²⁶

A study on the pedestrian casualties and fatalities in road traffic crashes was conducted by Division of Economics, University of Natal, Durban, south Africa in 1999, a South African Municipality, was undertaken using official road traffic accident data. The pedestrians were in the age group of 25 to 44 years and accounted for 39.3% of the casualties and 48.2% of the fatalities. The most vulnerable pedestrians were those between 30 to 34 years old and they accounted for 11.7% of the casualties and 14.6% of the fatalities and those between age group 40 to 44 years accounted for 7.5% of casualties and 10.2% of the fatalities. Out of these cars were involved in 52% of the vehicle pedestrian crashes whereas mini buses and buses which were involved in 3% of vehicle pedestrian crashes and motor cycles were involved in 1% of the vehicle pedestrian crashes. There was no statistically significant difference in the monthly distribution of road traffic crashes.²⁷

In an another study conducted by the Department of Forensic Medicine and Toxicology at Government Medical College and Hospital, Chandigarh, India from 1994 to 2000 to know the various parameters of road traffic fatalities. Out of 1885 autopsies were conducted 795 cases were the victims of road traffic accidents, 270 (33.96%) cases were young adults of age groups 21-30 years were the major victims, followed by age group 31-40 years 163 (20.50%). Where as least number of victims were seen in 0-10

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years and more than 60 year were 29 (3.65%) and 33 (4.15%) respectively. Majority of victims were males involved in 642 (80.88%) of deaths, while females involved were 152 (19.12%). 335 (42.14%) victims were pedestrians, followed by two wheeler users 372 (39.15%). Buses were the most common offending vehicles 210 (26.42%), followed by cars 156 (19.62%). 490 (61.63%) of victims died within 24hrs of the accident and head injury was the most common cause of death. A continuing decrease in the rate and a persistent increase in the female fatalities following road traffic accidents were concluded.²⁸

Another study conducted to describe road traffic related mortality data in Iran between 1999 and 2000 in Iranian Institute of Health Sciences Research, Tehran, Iran, revealed the following data, a total of 15,482 individuals died from road traffic accidents, most of them were male (79%), mostly aged 40 years or less (65%) and most of them were pedestrians or car occupants (62%). Head injury was most common cause of road traffic related mortality (66%) in males and female of all ages. 57% of deaths occurred before admitting in the hospital. Of the total injuries, head injury was the most common cause of mortality and most of the deaths occurred before admitting to the hospital.²⁹

Study was conducted by Department of Emergency Medicine, Singapore General Hospital, Singapore, to identify the factors that are contributing for road traffic accident mortality and pattern of injuries over a period of 1 year in 2001. A total of 226 deaths occurred, of which 82.3% victims were males. The median age was 31 years. Blood alcohol was detected in 42 (18.7%) victims. In general head injury was the most common among road traffic victims accounting for (86.7%), followed by thoracic (67.7%) and abdominal (31.4%) injuries. Severe lower extremity trauma was most common among pedestrians and pedal cyclists (20.6% and 11.0%) respectively.³⁰

Study was conducted in Innsbruck University Clinics by the Department of Biological Psychiatry to know alcohol/benzodiazepine use in injured road users, admitted to the Emergency Room of the University Hospital of Trauma surgery in Innsbruck, Austria in 2001. The large majority of patients were drivers (55%), followed by passengers (19.7%), cyclists (12.6%), followed by pedestrians (12.3%) respectively. Blood samples of 269 patients involved

in road traffic accidents were analysed. Alcohol was most commonly found drug in all groups constituting drivers (36.9%), passengers (15.1%), cyclists (29.4%), followed by pedestrians (18.2%). The commonly detected Benzodiazepine was diazepam, benzodiazepine consumption was seen in drivers (8.1%), passengers (5.7%), cyclists (8.8%), followed by pedestrians (3%). As compared to males, females showed lower frequencies of using both alcohol and benzodiazepine. Frequency of alcohol was higher in patients less than 60 years of age.³¹

A six year retrospective review of medico legal autopsies at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria in 2001 to highlight pedestrian deaths resulting from RTAs. It was found that cars constituted the commonest cause of pedestrian deaths (51.2%), which was followed by motorcycles (39.5%) and with heavy vehicular deaths contributing to 9.3%. The male to female ratio was 1.5:1. The under 20 years age constituted 32.6%, while the under 30 years constituted 53.5%, involved in accidents. Multiple injuries contributed to 48.8%, followed by head and neck injuries (34.9%).³²

A study conducted by analysis from both National and police data (2001) and data from the Rhone Medical Road Accident Trauma Register (1996-2001) to know differences between males and females in traffic accident risk in France in 2001. In France 7,720 people were killed in RTAs in 2001, 75% of which were men, where as the number of injured people were 153,945 of which 65% were men. Male and female incidence rate was 3.1 for mortality and 1.7 for morbidity. Two wheel motorized vehicle accidents are very specific to males. The fatality rate and severe injuries rate among survivors are higher, Males are more severely injured for all body regions and have more often severe after effects.³³

A population study conducted by Department of Health and Society, Division of Social Medicine and Public Health Science, Faculty of Health Sciences, Linköping, Sweden in 2001 to acquire knowledge about prevalence of first aid training and incidence of being a bystander and of the first aid provided at traffic crashes and impact of first aid training on the risks people take in road traffic. A questionnaire was administered to 2800 randomly selected persons aged 18-74 years. The response rate was 67.55. During the previous five years, 39% of the population had received

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first aid training with higher rate among younger individuals and those with higher education .After training,30% of the respondents had used their skills and 41% took fewer risk in traffic ,particularly those who were older or had a lower level education.14% of those with training had been bystanders at a traffic crash and at 20% of the crashes, a bystander had administered first aid ,and one third of those who provided such assistance had use of their training.³⁴

In a study done on 331 victims of road traffic accident at KMC Manipal Karnataka in 2001,revealed that the maximum number of victims 23(26%) were in the age group of 21-30 years ,followed by 17(20%) in 41-50 years age group. male to Female ratio was 7:1.among the 87 victims,26(29.9%)were pedestrians and 61% were occupants in various types of vehicles,of which 33(37.93%)were two wheelers ,10(11.4%)were three wheeler occupants,18 (20.68%) were four wheelers occupants. Two wheelers are more prone for accidents as compared with three and four wheeler vehicles. Most of chest injuries included contusion and laceration.³⁵

As per NCRB report (2002), 63% of deaths occurred in 16-44 years with children and elderly constituting 8.6% and 7.5% respectively. The male and female rates were 13.0 and 3.0/100,000 respectively. Among men, highest rates of 45% were noticed in 30-59 years . Data from SCD (n=1,049,) reveal that the age group of 25-34 years recorded highest number of RTI deaths (21%), followed by 15-24 years (19%), 35-44 yrs (16%), 45-55 yrs (15%), 60+ yrs (14%) and 5-14 yrs (11%), with a total 71% in 15-54 years. As per MCCD report, 69% of RTI deaths were in the age group of 15-54 years, Children (<15yrs) constituted 7.2% and 15% of motor vehicle deaths in MCCD and SCD reports, while elderly (65+) accounted for 10% and 21%, respectively. Gururaj et al (2004) studied that nearly 60-70% of RTI subjects were in 15-44 years age group . The limited number of population-based studies also indicate that the age groups of 15-44 yrs constitute nearly 2/3 to 3/4 of total RTI patients by Varghese and Mohan. Gururaj and Suryanarayana, studied that Children and elderly have contributed for approximately 10-15% of deaths in these studies.³⁶

The population based survey undertaken in Bangalore (Gururaj and Suryanarayana) and Chennai (Sathyanarayana) revealed that 2/3 of injured and killed were with lower levels of education, employed in skilled and

unskilled categories and were married. A recent study from Bangalore has revealed that mortality from RTI was 13.1 and 48.1 in poorer categories of urban and rural population, while it was 7.8 and 26.1 per 1,00,000 population in non-poor categories.³⁶

The recent report of WHO also highlights that poor people in all low and middle-income countries bear the greatest burden of RTIs (WHO, 2004a).¹

As per Mohan (2004a), nearly 80% of those killed in Delhi and Mumbai are vulnerable road users. Collision of heavy vehicles like buses and trucks with these road users results in greater number of severe injuries and deaths. In urban and suburban areas, buses and trucks are involved in higher proportion of fatal crashes with VRUs. Among fatalities during peak hours, 62% of responsible vehicles for crashes were buses or trucks, while those killed were primarily pedestrians, bicyclists or motorcyclists. Even on national highways, pedestrians constitute 30% of fatalities and 65% of all deaths occur among VRUs.³⁷

Dandona and Mishra (2004) observed that pedestrians (40%) and motorized two wheeler riders and pillion (32%) were the major category of killed people. Data from Chennai reveal that pedestrians, two-wheelers and cyclists constituted 28%, 15% and 29% of total deaths (Sathyasekaran, 1991). Hospital studies in Bangalore during 1993, 1998, and 2005 have shown that pedestrians, motorized two wheeler occupants and bicyclists are injured and killed to the extent of 25-35%, 30-40% and 7-10% with minor variations across studies (Gururaj, 1993; 2000; 2005). Studies from Delhi, Pondicheery, Chennai, Hyderabad, Patiala point to similar observations. Data from population-based surveys also indicate a similar picture. In a recent study of 709 RTI injured persons from a population base of 96,619, it was observed that pedestrians, two wheeler occupants and bicyclists constituted 26%, 43% and 8%, respectively.³⁸

Verma and Tiwari in a study of 5412 households covering 30,554 populations in Delhi noticed that two wheelers (46%), pedestrians (25%) and bicyclists (14%) were involved in very high numbers.³⁹

The studies undertaken by NIMHANS hospital during 2003, mode of management revealed that either nearly 45% were provided treatment in

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the emergency room and referred to other hospitals, 48% were admitted for short or long term observation for investigations and medical management. Surgical intervention was undertaken in 6% of the total brain injured persons.¹

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