Original Research Paper

Epidemiological Study of Two Wheeler Accident Victims In Rural South India

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Abstract

Vehicular accidents are steadily mounting up on the Indian roads, so critical analysis of causative factors is pivotal to prevent them in future. This study was designed to assess the epidemiological factors constrained in two wheeler accident victims. It's a cross-sectional study of two wheeler related deaths autopsied at the IGGGH & PGI in Pudducherry. Data gathered by interviews, autopsy and results were analysed. Two wheeler crashes were accountable for 10.85% of all 1318autopsies. Most vulnerable are males (81%) and individuals between 16-29 years (35%). Most victims were from rural area (47%), Hindus (79%), married (49%) and middle income (62%) group. These fatal events frequent on national highways (36%), evening rush traffic hours (42%) and involves motorcycle occupants (64%) and pedestrians (24%). Prime RTA contributors like human errors; vehicle and road factors were evaluated. Importing awareness and education among vulnerable population alleviate the frequency of accidents and dreaded outcomes.

Key Words: Two wheeler accidents, Fatalities, Motorcycles, Human errors

Introduction:

Worldwide, every day about 3400 people die due to road traffic accidents (RTA) and predicted to result in death of around 1.9 million people annually by 2020. [1]

Nearly 90% of world's RTA fatalities are occurring in low and middle-income countries, whereas highly motorised countries contribute very little though they accommodate over 60% of world's vehicles. [2] RTAs are the sixth leading cause of death in India (over 1, 30, 000 deaths / year) and responsible for huge share of emergency hospitalization, socio-economic burden, disabilities and deaths of young and middle aged population. [3]

Currently two wheelers are major component of road traffic, preferred family vehicle and they have taken mega share of road accidents. Motorcycle users, pedestrians and pedal cyclists are vulnerable road users. [1]

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They are directly exposed to impacting vehicle or hard objects during collision and likely to get injured severely. Even though two-wheeler related RTA deaths are very familiar on Puducherry roads and seemed to have been overlooked. Hence this study is aimed at interpreting epidemiological factors in two-wheeler accidental deaths.

Materials and Methods:

This study was conducted at the Indira Gandhi Government General Hospital and Postgraduate Institute, Puducherry (Union territory in South India) from 1st January to 31st December 2013.

Among the medico-legal autopsies conducted in the study centre, all two wheeler (motorized and non-motorized) related accidental deaths were included in this observational, cross section study.

Data of demographic characteristics and epidemiological factors behind every subject died in two wheeler accident were collected by personal interview with the concerned police authorities, relatives of the deceased, eye witnesses and survivors in the same accident.

This was further evaluated to understand the human, vehicle and road factors in causing accidents. All body findings including injuries were personally examined at autopsy and correlated with the history.

RTA deaths involving other than two wheeler vehicles, non-vehicular accidents & injuries, and non-confirmed cases are excluded

from this study. The collected data was analyzed manually as well as using the Microsoft excel package (2010). Statistical analysis was done for frequencies, percentages, proportions & ratios and results were interpreted.

Observations and Results:

Overall, 1318 medico-legal autopsies were conducted in the study centre during calendar year 2013, among them 312 are RTA cases and 143 cases are purely two wheeler related RTA deaths. Accordingly, two wheeler mishaps are accountable for 45.8% of RTA deaths and 10.85% of all autopsies.

Two wheeler fatalities were significantly higher in males (81%) than females (19%) with a gender ratio of 4.3:1. More victims were in the age group of 16-49 years (68%), but young adults between 16-29 years (35%) are vulnerable to accidents. (Table 1)

The majority of the victims belong to rural population (47%), Illiterates and Low education (70%), Hindu religion (79%), Employed & students (48%) and middle income (64%) group. (Table 2)

Majority of the fatal two wheeler accidents occurred in rainy season, weekends (40%), daytime (62%), and nearly half of them reported during evening rush traffic hours. (Table 3) Fatal accidents happened more on national highways (36%) and less on village roads (13%). Two wheeler riders (46%) & pillion riders (18%) were affected maximum than pedestrians (24%), and pedal cyclists (09%) were least affected in this study.

The geared motorcycles (78%) are often involved in fatal accident than mopeds (13%) and pedal cycles (06%).

Maximum victims were brought to hospital within an hour of accident and rest were found dead at the scene of accident. Nearly three-fourth of victims was died within first 24 hours of accidents and only four cases have been survived more than a week. (Table 4)

The human errors were found to be the commonest causative factor for fatal accidents compared to vehicle and road contributors.

The most important causative factors are motorcycle occupants not-wearing of helmets (84%), riders doesn't have driving license (33%), driving under intoxication (27%), over-speeding (15%), bad & narrow roads (28%), and over- taking (10%). (Table 5)

Discussions:

Many social factors like unemployment, poverty & education forced rural people to migrate into urban / suburban areas, and to adapt urbanization and motorization.

Two wheelers are preferred transportation vehicles for vast Indian families as they are cheaper, gives better mileage, carry at least 2 to 3 passengers, easy to park & ride in traffic congestion. Two wheeler accidents are contributed for nearly half of total RTA deaths, two wheeler users and pedestrians have the highest rates of fatal injuries. [4, 5]

The several factors blameworthy for high two wheeler accident are more vehicles on Indian traffic, Vehicle vulnerability, poor road status, coupled with non-adherence of riders to road safety rules & traffic laws.

Males spend lots of their time in travelling and various outdoor activities, so they are prone to accidents and having unfavourable gender ratio. [6] Individuals between 16 to 49 years of age are regularly tangled in fatal RTA and more so by the young adults.

Earlier studies also reported that most victims were males in the age group of 20-49 years, [7, 8] 18-37 years [9] and 18-44 years. [10] These people are more likely to expose, travel lot, take risks and involve in fatal accident, and may lead to huge financial burden to the families and disabled permanently.

Contrast to earlier studies, the most victims are rural and semi-urban inhabitants in the present study as it was conducted in rural population.[11] Greater proportion of victims in two wheeler RTA are illiterates and low education personals and it may be correlated with poor road sense / Ignorance of road safety rules and traffic sense. [7, 12]

High incidence of accidents during summer and rainy seasons are closely related to travelling activity of people, deterioration of roads and environmental factors. [7]

Road accidents are occurring more during weekends, daytime and at evening hours and these findings are closely resembles other research studies. [7, 8]

The crest of accidents during these hours coexist with soaring traffic density, traffic congestion, urge to reach destination in time, high people movements to office, schools, factories, business place & house) and failure to follow traffic rules. Agriculturists here use two wheelers (pedal cycle or motorcycles) a lot for travelling, but they have little or no knowledge on road safety rules & laws.

Indian motorcyclists and pedestrians are vulnerable to fatal accidents, whereas pedestrians & pedal cyclists, Pedestrians & car occupants are vulnerable to accidents according to studies conducted abroad. [13]

Narrow roads, Lack of footpaths & subways, low traffic sense and road safety

knowledge among rider and pedestrians makes them vulnerable for road traffic accidents on Indian roads. [14] The reasons for high incidence of accidents on the highways (National & State) and city roads might be these roads are busiest, very narrow, too much traffic during peak hours, no traffic signals at junctions and no strict enforcement of road safety rules.

It is noteworthy that majority of victims were brought alive to hospital in two wheeler accidents and excess of them were died in first 24 hours. Multifactorial involvement in accident outcome are such as the severity of accident, transportation problems, lack of medical emergency services, insufficient & untrained staff and facilities in the hospitals.

Hence the timely availability of quality emergency medical services to the injured will play a crucial role in preventing mortalities and disabilities. Too many factors (human, vehicular and roadways) contribute for causation of two wheeler accidents, and human errors are responsible for many fatalities.

Though certainly know the fact that helmets reduce head, facial and brain injuries significantly, still most of the motorcycle occupants were found not-worn helmet at the time of accident. Driving a vehicle under intoxication is a crime, because alcohol intoxication impairs driving ability of a person and level of impairment is directly related to blood alcohol concentration. [15]

Use of mobile phones while driving a vehicle is associated with a high chance of accidents and hence traffic laws prohibit the use of these gadgets by the rider while driving.

Many countries have imposed restrictions on the high speeding, legal age for driving license, graduate driver licensing, increase in fine & withdrawal of Driver's license and speed control interventions have led to significant reduction in traffic accidents. [16]

Conclusions and Suggestions:

Fatalities are remarkably high in motorized two wheeler accidents and most victims are males and young adults.

Enhanced awareness and education to the general public and vulnerable road users on obeying traffic rules, use of road safety and protective measures while driving will mitigate accidents. Fatal accidents were frequently occurs in daytimes, peak hours of traffic and maximum victims are died within first 24 hours.

Availability of excellent emergency trauma care centres & ambulance services during the early hours of trauma in rural India will dramatically reduce mortalities and disabilities.

Though multiple factors interacted in causation of RTA, they can be prevented to certain extent by implementing and enforcing traffic laws strictly such as drunken driving, crash helmets, mobile usage, and speed limit.

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Table 1: Age and Gender-wise Distribution of Fatal Two-wheeler Accident Cases

Age grps (Yrs)	Male (%)	Female (%)	Total (%)
0 - 9	03 (02)	01 (01)	04 (03)
10 -19	14 (10)	03 (02)	17 (12)
20 -29	30 (21)	06 (04)	36 (25)
30 -39	23 (16)	05 (03)	28 (20)
40 -49	13 (09)	06 (04)	19 (13)
50 -59	18 (13)	02 (01)	20 (14)
60 -69	09 (06)	03 (02)	12 (08)
> 70 years	06 (04)	01 (01)	07 (05)
Total	**116 (81)**	**27 (19)**	**143 (100)**

Table 2: Demographic Characteristics of Deceased in Fatal Two-Wheeler Accidents

Demographic Characteristics	Cases (%)
Native area or Domicile	
Rural	67 (47%)
Semi-urban	50 (35%)
Urban	21 (15%)
Unknown	05 (03%)
Total	143(100%)
Educational Status	
Uneducated	36 (25%)
Primary School	23 (16%)
Secondary& Intermediate	42 (29%)
Graduation & above	33 (23%)
Unknown	09 (06%)
Total	143(100 %)
Socioeconomic Status	
Lower	31 (22%)
Lower Middle	39 (27%)
Upper Middle	50 (35%)
Higher	17 (12%)
Unknown	06 (04%)
Total	143 (100%)
Marital Status	
Single	61(43%)
Married	70 (49%)
Divorced/ Separated	04 (03%)
Widow	01 (01%)
Unknown	07 (05%)
Total	143 (100%)
Occupational Status	
Unemployed	26 (18%)
Employed & Business	36 (25%)
Students	33 (23%)
Housewives	11(08%)
Agriculturist & Laborer	37 (26%)
Total	143 (100%)

Table 4: Epidemiological Factors in Fatal Two Wheeler Accidents

Epidemiological Factors	Cases (%)
Types of Road	
National Highway	52 (36%)
State Highway	25 (17%)
City Roads	33(23%)
Village Roads	18(13%)
Approach Road	12 (08%)
Unknown	03(02%)
Total	143(100%)
Two Wheeler Involved	
Geared Motorcycle	112 (78%)
Scooter	05(03%)
Moped	18(13%)
Pedal Cycle	08(06%)
Unknown	02 (01%)
Total	143(100 %)
Road User Status	
Pedestrian	34 (24%)
Rider	65 (46%)
Pillion Rider	26 (18%)
Pedal cyclist	13 (09%)
Others	02 (01%)
Unknown	03 (02%)
Total	143 (100%)
Time to Hospitalization	
Non- hospitalized	37 (26%)
Within an hour	79 (55%)
2-4 hours	21 (15%)
5-12hours	04 (03%)
12-24hours	01 (01%)
2 days onwards	01 (01%)
Total	143 (100%)
Survival Period	
Spot death	41 (29%)
Transpiration / <1hr hospital	45 (31%)
2-6 hours	21 (15%)
7-24 hours	15 (11%)
2- 6days	17 (12%)
7 days or more	04 (02%)
Total	143 (100%)

Table 3: Distribution of Fatal Cases According to Days and Time

Days & Time (24hr)	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total (%)
06:01-09:00	3	3	2	2	2	3	4	19 (13)
09:01-12:00	3	2	3	2	4	6	5	25 (17)
12:01-15:00	2	1	4	0	1	4	2	14 (10)
15:01-18:00	5	3	3	3	3	9	6	32 (22)
18:01-21:00	3	5	4	4	4	4	5	29 (20)
21:01-24:00	1	2	2	2	2	3	2	14 (10)
00:01-06:00	2	1	2	0	1	2	2	10 (07)
Total	19 (13%)	17(12%)	20(14%)	13(09%)	17(12%)	31(22%)	26(18%)	143(100)

Table 5: Contributing Factors for Causation of Fatal Accidents*

Human Errors	Cases (%)	Vehicle Factors	Cases (%)	Road Factors	Cases (%)
Drunken driving	39 (27)	Over speeding	22 (15)	Congested & Narrow road	25 (17)
Mobile usage	16 (11)	over crowding	06 (04)	Speed breakers	04 (03)
No- helmet	121 (84)	Over taking	15 (10)	Bad road	13 (09)
No driving license	47 (33)	Engine fault	03 (02)	Poor lighting	05 (04)
Negligent or Rash driving	22 (15)	Brake failure	02 (01)	Improper Crossing	03 (02)
Abiding traffic rules	17 (12)	Poor light	03 (02)	Improper/No traffic signals	07 (05)
Total	**262**		**51**		**58**

*Multiple responses