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Epidemiological Study of Road Traffic Accident Cases: A Study from South Odisha

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Abstract

The present study was designed to assess the various epidemiological factors related to cases of road traffic accident and to study the socio clinical aspects of patients admitted to the trauma Centre. For the purpose of the study, a Road Traffic Accident (RTA) was defined as “an accident, which took place on the road between two or more objects, in which one is any kind of moving vehicle and the other a human being”. The cases that are admitted to the Trauma Care Centre, Orthopedic ward, Surgery ward and FMT department following Road Traffic Injury during the study period (1st January 2011 to 30th June 2012) constituted the study population. It was a Descriptive study in which the victims of the accidents were interviewed to obtain the information about the circumstances leading to accident. Where the condition of the victims did not warrant the interview, the relatives or attendants were interviewed. The information about the patients brought dead to the dept. of F.M.T for Post mortem examination was collected from the relatives, policemen & witnesses. A pre-tested Performa specially designed for this purpose was used for interviewing the accident victims. For Statistical analysis Chi-square test, Proportions, SPSS-17 were used.

Key words: Road Traffic Accident, Epidemiological factors, Descriptive study.

Introduction

The process of rapid and unplanned urbanization has resulted in an unprecedented revolution in the growth of motor vehicles worldwide. The alarming increase in morbidity and mortality owing to Road Traffic Accidents (RTA) over the past few decades is a matter of great concern globally. Currently RTA rank ninth in order of disease burden and are projected to be ranked third by the year 2020. ^[1] Worldwide, the number of people killed in road traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million. ^[2] Every tenth bed in a hospital is occupied by an accident victim. The average cost of RTA in developing countries is estimated at 65 billion dollars; the global annual cost of RTA is almost 230 billion dollars.

Incidentally, India holds the dubious distinction of registering the highest number of road accidents in the world. The number of road accidents in India is three times higher than that prevailing in developed countries. ^[3] The number of accidents for 1000 vehicles in India is as high as 35 while the figure ranges from 4 to 10 in developed countries. ^[4] In India, over 80,000 persons die in the traffic crashes annually, over 1.2 million are injured seriously and about 3 Lakhs disabled permanently. ^[5] In India, for individuals more than 40 years of age, more life years are lost due to traffic crashes than due to cardiovascular diseases or neoplasm. While the mortality data could be available with little effort, the data on non-fatal victims suffering from various types of injuries is very difficult to get as it depends on which health care unit the victim reports for treatment. Trauma related death occurs in India every 1.9 minutes Although India has only 1% of the world's

motor vehicles, but it accounts for 6% of the total global RTA deaths.^[6] Alcohol intoxication causing RTA is present in 15-20% of all traffic accidents.^[6]

Most of the accidents occur in the age group of 18-37 years of population. This results in the double loss to the country.^[7] Firstly expenditure is incurred in the treatment of these victims and secondly being the most productive age group, it results in huge productive man-days lost. The higher incidence of accidents in these age groups can be attributed to the risk taking behavior of youths. The male: female ratio of 6:1 can be attributed to the fact that proportion of males as compared to females is more and in our society as males are the bread earners for the family and therefore involved usually in outdoor activities exposing themselves to accidents.^[7]

Objectives:

1. To assess the various epidemiological factors related to cases of road traffic accident.
2. To Study the socio clinical aspects of patients admitted to the trauma Centre.

Materials & Methods

Place of study:

MKCG Medical College in Berhampur is the only tertiary level health care for the districts of southern Odisha. So most of the complicated cases of these areas are admitted for treatment. Road Traffic Accident cases account for a large number of patients getting admitted to the hospital.

Study design: It was a Descriptive study.

Study duration: 1st January 2011 to 31st October 2012

Study population:

The cases that are admitted to the Trauma Care Centre, Orthopedic ward, Surgery ward and FMT department following Road Traffic Injury during the study period (1st January 2011 to 30th June 2012) constituted the study population. For the purpose of the study, a Road Traffic Accident (RTA) was defined as “an accident, which took place on the road between two or more objects, in which one is any kind of moving vehicle and the other a human being”.

Data collection & analysis

The victims of the accidents were interviewed to obtain the information about the circumstances leading to accident. Where the condition of the victims did not warrant the interview, the relatives or attendants were interviewed. The information about the patients brought dead to the dept. of F.M.T for Post mortem examination was collected from the relatives, policemen & witnesses. A pre-tested Performa specially designed for this purpose was used for interviewing the accident victims.

The information collected consisted of personal identification data, general epidemiological data, category of road users, day and time of accident, type of vehicles involved, severity of injuries and treatment outcome. The medico legal records and case-sheets of the victims were referred for collecting additional information.

Statistical Analysis: Proportions, SPSS-17

Results

A total of 18724 patients were admitted during the study period in MKCG Medical College, Hospital, Berhampur among which the 12.7% (2378) cases were of Road traffic Accident which constituted the study population. Figure-1 shows that the Infectious diseases like Malaria, Gastro-enteritis, and Tuberculosis etc. were the major (38.99%) burden & RTA cases amount to 12.7% of disease burden (Figure-1). It was observed that out of 2378 (100.00%) RTA cases in the study

area, 437 (18.37%) died among which 179 (40.96%) brought dead to the Dept. of F.M.T for Post Mortem examination and 258 died either in the hospital or en-route to hospital or after discharge.

Table-1 shows that majority (70.47%) of the study population belongs to the reproductive age group of 15-44 years. It was also observed that 121(5.08%) were in geriatric age group and 290 (12.19%) were children of bellow 15 years of age. The sex wise distribution reveals that among the study subjects 1695 (71.28%) were males and 683 (28.72%) were females with a male: female ratio of 2.48:1. In this study, the increased number of RTA cases among males in the age group 15 – 44 yrs may be attributed to the increased susceptibility of this age group.

Among 2378 study population majority (65.81%) were residing in rural areas and only 34.18% belonged to urban population. The socio economic status (SES) of the study subjects was assessed by using the Modified Kupuswamy Scale, because the study cases were a blend of both the urban and rural population. Majority i.e. 1495 (62.9%) belongs to the low SES and only 12.2 % (291) were from the high SES. Of all the patients belonging to low Socio economic class males constituted 68.36% while female were the rest 31.64%.

Literacy is defined as “the ability to read and write for a person aged 7 or above”. Those cases above the age 7 years were therefore included in this analysis. The study reveals that out of the total 2378 study subjects, 70 cases were children below seven year of age for which the literacy status was assessed from the rest 2308 cases. It was found out that more than one third of the study subjects i.e. 834 (36.13%) were illiterates and likewise 17.37% (401) cases were just literate, only 223(9.66%) had higher secondary level education. Out of the 1648 males the literacy rate was found to be 70.5% while among females was 47.27%. High prevalence of RTA was found in people having low level of education i.e. Illiterates, Just Literate & Primary level educated subjects.

The present occupation of the study subjects was assessed and it was found that 23.75% were Casual labourers, 15.89% had Agriculture as their occupation. 11.6% were Employee in Service, 6.26% had their own business, and 12.86 % of the study subjects were housewives. 10.63% of the study subjects were found to be unemployed & 14.5% were students(Figure-2).

Figure-3 depicted that the number cases admitted with RTA was highest in the month of December (179 out of 2378 cases) and January (174 out of 2378 cases) & lowest in the month March (102 out of 2378 cases) and April (107 out of 2378 cases). During the winter season i.e. October to January a total of 632(26.57%) out of 2378 cases were reported. The increase of cases in winter season was due to poor adaptability in foggy environment. The highest number of RTAs (17.78%) took place on Saturdays followed by Sundays (17.07%) & the least number of RTAs occurred on Mondays (12.06%).

Maximum number of accidents occurred in between 3 and 7 p.m. i.e. 1047 (44.02%) followed by 689 (28.97%) between 7pm and 5 a.m. Least number of accidents (9.54%) occurred in between 5am to 8am. Only 10.97% (261 cases) were admitted to the hospital within one hour, 41.67% (991 cases) between 1 and 6 hours and the majority of cases beyond 6 hours i.e. 48.35 % (1126) of accident.

In table-3 we have shown that the majorities (44.32%) of the victims were using Motorized Two/Three Wheelers, 24.89% were pedestrians and 11.39% were cyclists. The four wheelers and public carriers amount to 10.21% & 6.89% respectively. Heavy vehicles constitute only 2.27%. The study of risk factors associated with accidents shows that majority (58.86%) of drivers had wreck less driving with high speed and in intoxicated condition, 37.85% were not using helmet, 17.06% had no license & 14.66% were not using seat belt.

Discussion

A total of 18724 patients were admitted during the study period in MKCG Medical College, Berhampur out of which Infectious diseases like Malaria, Gastro-enteritis, and Tuberculosis etc. accounted for more than one third (38.99%) of the cases. The proportion of RTA cases was 12.7% (2378) & these cases constituted the study population. It was observed that out of 2378 (100.00%) RTA cases in the study area, 437 (18.37%) died among which 179 (40.96%) brought dead to the Dept. of F.M.T for Post Mortem examination and 258 died either in the hospital or en-route to hospital or after discharge. The WHO global status report on road safety⁸ revealed that approximately 1.3 million people die each year on the roads and between 20 and 30 million sustain non-fatal injuries. If trends continue unabated deaths will rise to an estimated 2.4 million a year by 2030. Krug E⁹ reported that injuries contribute to around 10% of total deaths and 15% of disability-adjusted life-years (DALYs) globally. Recent studies suggest that injuries contribute to 13%–18% of total deaths in India. Odero et al.¹⁰ in a survey of 23 hospitals in Bangalore, RTIs contributed to 12% of total casualty registrations (varying from 7% to 34% in different institutions), 52% of total injury registrations, 22% of admissions, 6% of total casualty deaths and 35% of injury deaths.

Majority (70.47%) of the study population belong to the age group of 15-44 years. It was also observed that 121(5.08%) were in geriatric age group and 290 (12.19%) were children below 15 years of age. The sex wise distribution reveals that among the study subjects 1695 (71.28%) were males and 683 (28.72%) were females with a male: female ratio of 2.48:1. Jha et al.¹¹ and Patil SS et al.¹² Observed majority of the victims (73%) are in the productive age (15-44yrs) group which are predominantly males (88%). Only 10% victims under 15 years of age group are affected. Some of the particular high risk behaviour like-alcohol consumption, driving in high speed etc. is common in this specific group. So, adult males are commonly involved in RTAs. Highest numbers of RTA victims (31%) were found between the age group of 20 and 29 years reported from Delhi¹³ and Nepal¹⁴

However Dhingra N. et al.¹⁵ observed 16 to 30 years and 15-35 years age groups were more involved in RTA. Another study from Delhi,¹⁶ reported that people of the 3rd decade of age were most commonly involved in RTAs. Chunli C¹⁷ observed more than 69% of the victims were in the age group between 20-49 years. This shows that the people of the most active and productive age group are involved in RTAs, which adds a serious economic loss to the community. Mehta SP.¹³ found that below and above the age of 20 years, there were fewer accidents. The reasons may be that children are taken care of by elders and less use of vehicles in the adolescent age group. Lower proportion of RTAs in those aged 60 and above could be due to the generally less mobility of the people. The accident rates were 4.9 times higher in males than in females according to this study.

Among 2378 study population majority (65.81%) were residing in rural areas and only 34.18% belonged to urban population. A recent study by Aeron Thomas A.¹⁸ at Bangalore revealed that mortality from RTIs was 13.1 and 48.1 per 100 000 in the poorer socioeconomic strata of urban and rural populations, while it was 7.8 and 26.1 per 100 000 population in the 'non-poor' categories.

In our study we found majority i.e. 1495 (62.9%) belongs to the low SES and only 12.2 % (291) were from the high SES. Of all the patients belonging to low Socio economic class males constituted 68.36% while female were the rest 31.64%. Jolly MF et al¹⁹ observed that more people with lower levels of education were involved in RTAs. It has been reported that more accidents were seen among low & Middle socioeconomic group of people. Sinha et al.²⁰ observed people from low & middle socioeconomic class were affected more i.e. 198(55%) and 114(31.66%), respectively.

The study reveals that out of the total 2378 study subjects, 70 cases were children below seven year of age for which the literacy status was assessed from the rest 2308 cases. It was found out that more than one third of the study subjects i.e.

834 (36.13%) were illiterates and likewise 17.37% (401) cases were just literate, only 223(9.66%) had higher secondary level education. Out of the 1648 males the literacy rate was found to be 70.5% while among females was 47.27%. High prevalence of RTA was found in people having low level of education i.e. Illiterates, Just Literate & Primary level educated subjects. Sinha et al.²⁰ observed high prevalence of RTA illiterates i.e. 177(32.16%) and low educated i.e. 159(29.15%). Mehta SP.¹³ Studied road traffic accident cases admitted in Safdarjang Hospital, New Delhi found 21.4% had education upto 5th class & 19.3% were educated up to 8th class while 16.6% were illiterates. Victims with higher education (matriculation and above) were fewer in proportion.

. The present occupation of the study subjects was assessed and it was found that 23.75% were Casual labourers, 15.89% had Agriculture as their occupation. 11.6% were Employee in Service, 6.26% had their own business, and 12.86% of the study subjects were housewives. 10.63% of the study subjects were found to be unemployed & 14.5% were students. Jolly MF et al.²⁰ observed that the labourers constituted the largest group (29.9%) involved in RTAs, followed by employees in service, agriculturists and students in descending order.

The number cases admitted / died due to RTA was highest in the month of December (179 out of 2378 cases) and January (174 out of 2378 cases) & lowest in the month March (102 out of 2378 cases) and April (107 out of 2378 cases). During the winter season i.e. October to January a total of 632(26.57%) out of 2378 cases were reported. The increase of cases in winter season was due to poor adaptability in foggy environment. Wang ZG et al.²¹ Observed RTAs are increased in the winter season as the drivers have poor adaptability to light in foggy environment. The month of "December" may be regarded as the "month of festival" (picnic, new-year celebration, game competition etc.) during which period the vehicles are driven with alcohol intoxication and transport volumes are increased rapidly. According to Ghosh PK.¹⁶ the highest number of accidents were observed in January and the maximum number of victims were also highest compared to other months. There was some increase in RTAs in the month of October, which may be attributed to the rainy season and, therefore, wet conditions of the road. Out of 494 victims who could be interviewed, 121(24.5%) mentioned that the roads were wet at the same time.

The highest number of RTAs took place on Saturdays (17.78%) followed by Sundays (17.07%) & the least number of RTAs occurred on Mondays (12.06%). Ghosh PK.¹⁶ Observed in Delhi the highest numbers of accidents were on Sundays and lowest on Mondays. Stallones Ra et al.²² found in California the highest occurrence of RTAs was on Saturdays.

Maximum number of accidents occurred in between 3 and 7 p.m. i.e. 1047 (44.02%) followed by 689 (28.97%) between 7pm and 5 a.m. Least number of accidents (9.54%) occurred in between 5am to 8am. Mehta SP.¹³ Studied road traffic accident cases admitted in Safdarjang Hospital, New Delhi and found two peak times for accidents i.e. in between 9 and 10 AM and between 4 and 5 PM. These hours are the busiest as commuters go to and return from the schools, offices, factories and business place. More than 60% of accidents took place in the day time (6 AM to 6 PM). These times coincide with the period when people are more active and mobile. Nos. of vehicles and pedestrians are maximum in day light (school, office hrs.), followed by light phase of light (marketing, recreation hrs.) and dark phase of night (rest hrs.). But the driver and pedestrian have poor adaptability to twilight (light phase of night) for which the accident rate is maximum (50%) followed by daylight (34%) which is due to thick concentration of vehicles and pedestrian in the road.

Only 10.97% (261 cases) were admitted to the hospital within one hour, 41.67% (991 cases) between 1 and 6 hours and the majority of cases beyond 6 hours i.e. 48.35 % (1126) of accident. According to Gururaj G.²³ cases admitted after accident were 14.6% within an hour, 47.3% between 1 and 6 hours & 38.1% were admitted to hospital after 6 hours of incidence.

Majorities (44.32%) of the victims were using Motorized Two/Three Wheelers, 24.89% were pedestrians and 11.39% were cyclists. The four wheelers and public carriers amount to 10.21% & 6.89% respectively. Heavy vehicles constitute only 2.27%. The study of risk factors associated with accidents shows that majority (58.86%) of drivers had wreck less driving with high speed and in intoxicated condition, 37.85% were not using helmet, 17.06% had no license & 14.66% were not using seat belt. Hospital studies in Bangalore by Gururaj G.²³ have shown that pedestrians, occupants of MTWs and bicyclists are injured and killed to the extent of 25%–35%, 30%–40% and 7%–10%, respectively. Mohan D et al²⁴ in a review of traffic injuries and fatalities in India emphasized that nearly 70% of those killed in Delhi and Mumbai belong to the group of VRUs.

Conclusion

The burden of RTA cases was 12.7% of total cases admitted during the study period. The numbers of cases were highest in the month of December and January & lowest in the month March and April. During the winter season i.e. October to January maximum cases were reported. The increase of cases in winter season was due to poor adaptability in foggy environment. The highest number of RTAs took place on Saturdays followed by Sundays which are the weekends indicating the population to be in state of release from work pressure.

Maximum number of accidents occurred in between 3 and 7 p.m. indicating the busiest hours of work related travel. Least number of accidents occurred in between 5am to 8am. as this is the time of rest & people are usually in their residence during this period. Majority of the study population belongs to the age group of 15-44 years. The sex wise distribution reveals that males are predominantly affected with male: female ratio of 2.48:1. In this study, the increased number of RTA cases among males in the age group 15 – 44 yrs may be attributed to outdoor activity, vehicle driving, reckless & irresponsible driving habits etc.

The study revealed that the prevalence of RTA was more in rural population having low SES which could be due to their pursuance of occupation in nearby urban areas for which they are mobile and have increased chance of exposure. The prevalence of RTA was found in people having low level of education i.e. Illiterates & Just Literate subjects which could be attributed to the lack of knowledge on road safety measures. In this study majority of the victims were using Motorized Two/Three Wheelers indicating wreck less driving habits by this section of motorists.

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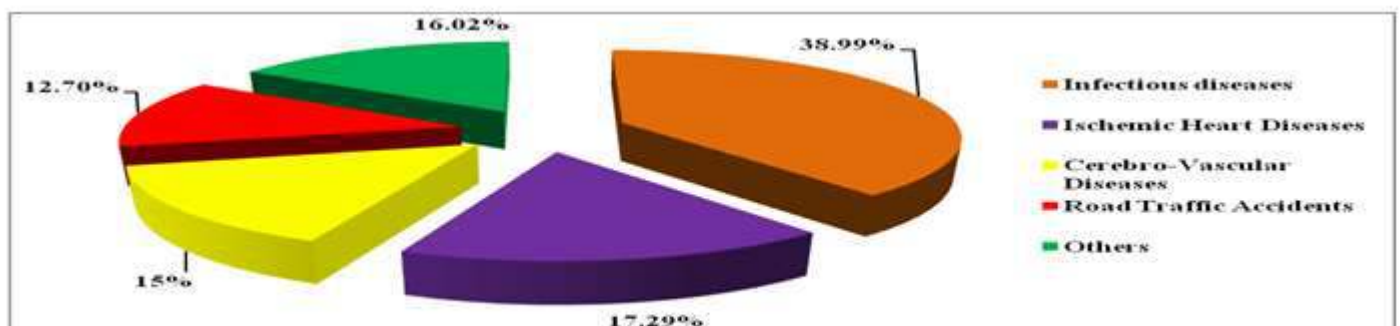


Fig: 1- Burden of Cases

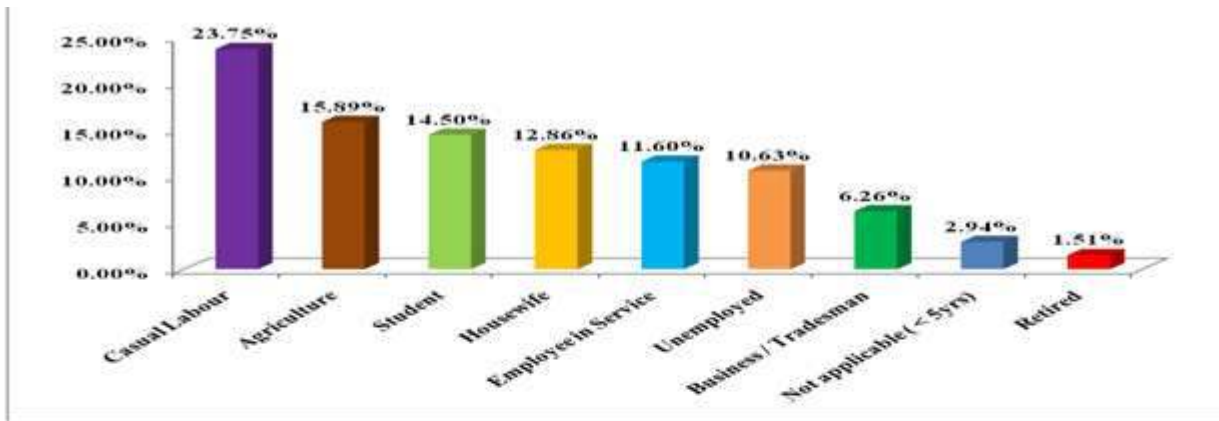


Fig: 2–Occupation wise Distribution of Cases

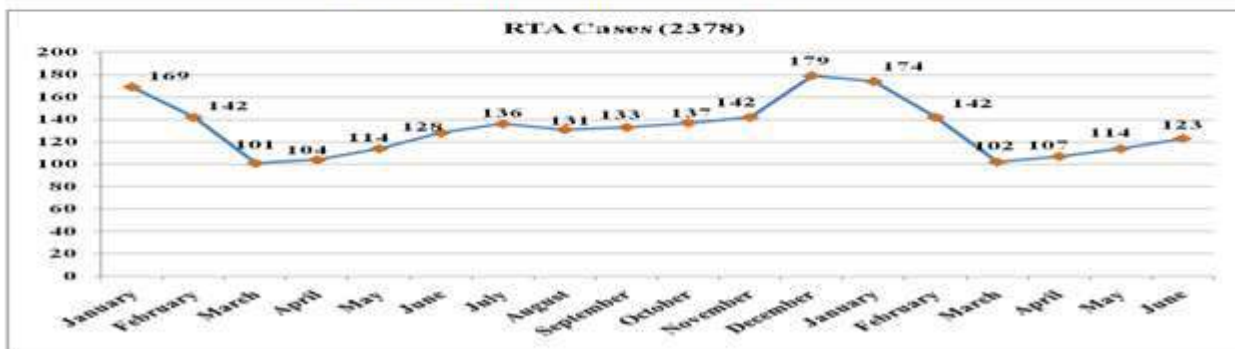


Fig: 3 - Month wise Distribution of Cases (n=2378)

Table 1:- Age and Sex Wise Distribution

Age	Male	Female	Total
0 – 4Yr	47 (1.97%)	23 (0.96%)	70 (2.94%)
5 - 14Yr	131 (5.5%)	71(2.98%)	202 (8.49%)
15 - 29Yr	601 (25.27%)	219(9.20%)	820 (34.48%)
30 – 44Yr	618 (25.98%)	238(10.00%)	856 (35.99%)
45 – 60Yr	214(8.99%)	95(3.99%)	309 (12.99%)
> 60Yr	84 (3.53%)	37(1.55%)	121 (5.08%)
Total	1695 (71.28%)	683 (28.72%)	2378 (100.00%)

Table 2:- Victim and Vehicle

[1] Type of Road Users	[2] No. of Cases
1. Pedestrians	[3] 592 (24.89)
2. Motorized Two/Three Wheelers	[4] 1054 (44.32%)
3. Four Wheelers (Car, Jeep, Van)	[5] 243 (10.21%)
4. Public Carriers (Bus, Mini Bus)	[6] 164 (6.89%)
5. Cyclists	[7] 271 (11.39%)
6. Heavy Vehicles (Trucks)	[8] 54 (2.27%)
[9] Total	[10] 2378 (100.00%)