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RESEARCH ARTICLE

AN OBSERVATIONAL STUDY TO FIND OUT THE EPIDEMIOLOGY OF THE ROAD TRAFFIC ACCIDENT VICTIMS IN THE KASHMIR VALLEY OF J & K STATE

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ABSTRACT

Background: About 120,000 people die on road in India every year. Although India has only 1% of the world's motor vehicles, but it accounts for 6% of the global road traffic deaths.

Research question: What are the different epidemiological determinants related to road traffic accident cases?

Objectives: 1. To study the various epidemiological factors related to road traffic accident cases.

Study design: Descriptive study.

Setting: Study was performed in two tertiary healthcare delivery institutes in Kashmir.

Participants: 316 victims of road traffic accidents who reported to BJH & SMHS hospitals in one year period.

Study variables: Demographic characteristics of the victims, time, day and month of accidents. Category of road users involved in road traffic accidents, mode of accidents etc.

Statistical analysis: Proportions and percentages.

Results: There were 80.7% male and 19.3% female accident victims. Students were the maximum (22.2%) among the victims. Majority of the victims belonged to the joint families 207(66%) whereas 109(34%) were from nuclear families. Those driving the vehicles constituted the largest (44.9%) of the victims followed by Pedestrians (31.6%). Among the motorized vehicles, two wheeler drivers were more (44.3%) involved in accidents.

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INTRODUCTION

Road travel brings society benefits, but the price society is paying for it is very high. Road traffic injuries are a growing public health problem, disproportionately affecting vulnerable groups of road users, including the poor (Peden Margie, 2004). Injuries are not considered a public health problem in all countries and moreover there is a total lack of safety awareness in societies (WHO South - East Asia Region Report, 2002). The number of injuries in terms of deaths, hospitalizations, disabilities and socioeconomic losses are increasing from year to year and it is estimated that in South-East Asia Region nearly 3% of GDP is lost due to road traffic injuries alone. Correspondingly, the health systems in these countries are not geared to handle this emerging problem in terms of prevention, especially due to lack of professional and

technical expertise, along with absence of policies and programs. This has resulted in a huge burden on health care systems, which are already overburdened due to various deficiencies (WHO South - East Asia Region Report, 2002). With the extraordinary increase in road traffic in South-East Asia, road traffic injuries have been a major public health problem resulting in deaths and injuries.

The problems faced in this Region are very different from the issues in the developed countries on a number of issues like age-sex distribution of population, composition of traffic, greater involvement of heavy vehicles in deaths, high proportion of motorcycles and bicycles amidst complex road environments. In India with increasing socio-demographic transition, booming economy and technological advances there has been increasing urbanization and industrialization. With an enhanced economic spending capacity and more affordability of vehicles there has been an extraordinary increase in the number of incidents from road traffic accidents and the injuries thus caused (WHO South - East Asia Region Report, 2002).

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About 120,000 people die on the road in India every year. Although India has only 1% of the world's motor vehicles, but it accounts for 6% of the global road traffic deaths (Madan V S, 2006). Current road safety efforts fail to match the severity of the problem (Peden Margie, 2004).

Objective: 1.To study the socio-demographic profile of the road traffic accident victims.2.To examine the epidemiological determinants associated with the road traffic accidents.

Study Design: The present study was a cross sectional observational study.

Setting: The study was conducted in two tertiary healthcare delivery institutes in Kashmir valley, the government Bone and Joint Surgery Hospital Barzulla and the emergency/ casualty department of the SMHS Hospital Srinagar both being the associated hospitals of the government medical college Srinagar.

Study Duration: The study period was conducted for a period of one year from 1st April 2011 to 31st March 2012.

Case Definition: Road Traffic Accident (RTA) was defined for the purpose of this study as "an accident which took place on the road between two or more objects, one of which had to be a moving vehicle and the other a human being".

Case Selection and Exclusion: Those road traffic accident victims who visited the above mentioned hospitals and were retained there for overnight or more were only included in the study.

The following road traffic accidents were excluded from the study:

- Any injury on road occurring without the involvement of a vehicle (for example a person slipping and falling on the road and sustaining injury).
- Any injury on road occurring with involvement of a stationary vehicle (for example a person getting injured while washing or loading a vehicle).
- Road traffic accident victims or the attendants of critically injured victims who did not consent for the interview.
- Fatally injured road traffic accident victims.

Study Group: The study group comprised of the 316 road traffic accident victims who reported to these hospitals in the above one year period. These were interviewed to obtain information about the circumstances leading to the accident and where the condition of the victims did not warrant the interview, the relatives or attendants of the victim were interviewed.

Data Collection: A semi-structured questionnaire designed and pre-tested was used for interviewing the traffic accident victims. The socio-economic status of the victims was evaluated using the modified B G Prasad's socio-economic scale for the year 2010 (52) (based on per capita per month income). The data thus obtained was arranged in a tabulated form and analyzed using appropriate statistical techniques and inferences arrived at.

RESULTS

The majority of the road traffic accident victims 118(37.3%) were in the age group of 15 to 30 years. Males accounted for

81% (255) whereas the females 19% (61) of the accident victims with a male: female ratio of 4.2:1. There were more victims from the rural areas 209(66%) as compared to urban areas 105(33%) and few victims were from outside the state.

Most of the road traffic accident victims 54%(172) were single whereas around 46%(144) were married at the time of the interview. 31.9%(101) victims were illiterate. Among educated road traffic victims, there were 168(53%) school grades compared to 40(13%) middle pass, 34(11%) matriculates and 47(15%) graduates, whereas Students formed a major group of road traffic victims and were involved in 22%(70) of the traffic accidents. Those employed in private or government sector and those engaged in various business activities accounted for 19 %(61) and 17 %(52) of the traffic accidents respectively.

Table 1. Age Distribution of the Road Traffic Accident Victims (n=316)

Age group (years)	Frequency(n)	Victims (%)	Cumulative %
0-15	34	10.8	10.8
16-30	118	37.3	48.1
31-45	106	33.5	81.6
45-60	35	11.1	92.7
≥60	23	7.3	100.0
Total	316	100.0	-

Table 2. Distribution of road traffic accident victims as per their category of road use and the vehicle primarily involved in the accident (n=316)

	Driver	Passenger	Pedestrian	Total
Two Wheeler*	88	42	10	140
Light Motor Vehicle**	15	11	39	65
Bicycle	35	0	1	36
Truck	4	2	28	34
Bus & Minibus	0	17	13	30
Three Wheeler*	0	2	9	11
Total	142	74	100	316

*motorized vehicles.

**cars, jeeps and vans.

Most of the victims 158(50%) belonged to class- II socio-economic status followed by class- I 95(30%). Only a few victims were from class-IV and class-V. Major co-morbidity seen in the RTA victims was hypertension 65*(20.5%) followed by diabetes mellitus 17(5.3%), hypothyroidism 13(4.1%). Few cases of seizure disorder 5(1.5%) along with single cases (0.3%) of bradycardia and depression were also noted. (*multiple responses) Majority of victims with co-morbidities 73(94.8%) were currently on treatment barring a few 4(5.2%) who had discontinued their treatments. History of visual impairment was present in around 16% (49) of road traffic victims, and barring a few 4(8.2%), most of the victims 45(91.8%) with history of visual impairment were on treatment. Among the vehicle occupants motorized two wheeler drivers formed the majority whereas most of the drivers were without a valid driving license and had less than 5 years of driving experience. Pedestrians formed the second major group of victims and majority of them were injured while walking or running on the wrong side of the road (78.3%). Students accounted for the majority of the victims followed by those employed in service or engaged in business activities.

More than half of the vehicles 265(57.6) involved in RTAs appeared in bad condition and poorly maintained whereas 195(42.4%) were in good condition and well maintained. Most of the pedestrians were injured while they were simply walking on road 53(53%) followed by those who were injured while crossing the road 25(25%). In addition 15(15%) were injured while they were just standing on road and 7(7%) while running on road. Cell phone use at the time of RTA was reported in only 38(12%) of victims. Among the drivers injured in RTAs 34 were bicyclists who did not require a license and out of the remaining, 55.5% (n=108) had a valid driving license whereas 44.5% had none. Majority of the accidents occurred on weekdays 234(74%) with major peaks during Mondays 52(16.5%) and Tuesdays 49(15.6%) followed by 82(26%) only on weekends. Of the total accidents 82(26%) occurred on weekends, 51(16.1%) on Saturdays whereas 31(9.8%) occurred on Sundays.

Most accidents occurred in the second quarter 100(32%) of the year whereas the first quarter experienced the least 51(16%) accidents followed by the third and the fourth quarters which experienced almost the same number of accidents 84(26%) and 81(25%) respectively. Majority of the accidents 122(39%) occurred between 4 to 8 pm followed closely by those occurring between 8 to 12 am, 120(38%). Minimum accidents were noticed between 4 to 8 am, 7(2%) and 8 to 12 pm, 12(4%), whereas almost negligible accidents 2(0.6%) occurred between 12 to 4 am. The most common mode of accident observed in the study was collision 135(42.7%) followed by knocked down 95(30.1%) and falling down 35(11.1%). Overturning of the vehicle and run over were reported in equal number of RTAs 15(4.7%) whereas 9(2.8%) reported hitting an object as the mode of accident.

Most of the RTAs occurred on clear & sunny days 180(57%) followed by cloudy days 80(25.3%). It was raining at the time of accident in 28(8.9%) and snowing in 6(1.9%) cases. Dark and dim light in the late hours of the day was reported in 22(6.9%) cases. Most of the RTAs occurred on main roads 191(60.4%) followed by highways 37(11.7%), crossings 32(10.1%), by lanes 30(9.5%) and intersections 24(7.6%). Only 2(0.65) RTAs were reported from market place. Majority of the RTAs occurred on the macadamized roads 292(92.4%) whereas 20 (6.3%) occurred on semi pucca gravel roads and only 4(1.3%) occurred on kucha earthy roads. The surface condition of the roads at the site of RTAs in 161(51%) of cases was good and well maintained whereas in 155(49%) cases it was rough and poorly maintained. The most apparent cause of RTA in the opinion of the victims was unsafe acts of the driver 287(90.8%) and unsafe conditions of the road 148(46.8%), followed by unsafe condition of vehicle 60(18.95) and bad weather condition 50(15.85).

DISCUSSION

In the present study, the highest numbers of RTA victims (37.3%) were found to be young people in the age group of 15 to 30 years. Similar results were reported from Nepal, New Delhi and other parts of the country (Sathiyasekaran BWC,1991) (Jha Nilambhar *et al.*, 2003) (Mehta,1968). It was further found in the present study that around 71% of the

victims were in the age group of 15 to 45 years. Similar results were also reported by Shamim *et al.* from Karachi Pakistan (Shamim *et al.*, 2011). This depicts that people in most active and productive age group are involved in RTAs. Lower proportion of accidents in those aged below the age of 15 years and those aged 60 years and above were observed in the present study. The reason may be that children in this age group mostly are not alone on the roads whereas the latter group, being relatively less active, are seen less on the roads.

In the present study it was seen that the males accounted for around 81% of the RTAs thereby outnumbering the females in a ratio of 4.2:1. Similar results also were reported from South India, many other parts of the Country and Nepal (Sathiyasekaran BWC, 1991) ((Jha Nilambhar *et al.*, 2003) (Mehta,1968) (Mishra Badrinarayan *et al.*, 2010). The reason may be that males are more mobile and more exposed to roads and RTAs than females. Victims from rural areas 209(66%) were more as compared to urban areas 105(33%), while as majority of the victims belonged to the joint families 207(66%). Similarly Badrinarayan *et al* reported that 65.83% of the RTA victims in their study were from rural areas and that only 34.2% of the RTA victims were from urban areas, while as most of the cases were from joint families 69% (Mishra Badrinarayan *et al.*, 2010). The possible reason seems to be the relative less exposure of rural population to roads with frequent heavy vehicular traffic compared to their urban counterparts.

In this study we found that majority 85% of the RTA victims had never been to college and around 32% were illiterate. Jha Nilamber *et al* observed that around 21% of the RTA victims had education upto 5th class, and 19% upto 8th class while as 17% were illiterate. They further reported that very few proportions of the RTA victims were educated up to matric and above ((Jha Nilambhar *et al.*, 2003). Similar results were also reported from other studies also (Mehta,1968) (Singh Abhishek *et al.*, 2011) (Jha *et al.*, 2010). It seems that illiteracy or poor education levels may be a contributory factor to the causation of RTAs perhaps due to relatively lesser road traffic sense. However, this relationship between education and RTA may not be causal. Furthermore victims from middle class families accounted for around 65% of the RTA victims with relatively less number belonging to low socioeconomic group. Badrinarayan *et al.* reported that RTA victims from middle socioeconomic class were affected most 55% (Mishra Badrinarayan *et al.*, 2010). However in another study most RTA victims were noted among low socioeconomic groups (Jolly *et al.*, 1991).

In this study we also observed that students constituted the largest group (22%) involved in RTAs followed by people who were employees in service (19 %) or engaged in business activities (17%). Labourers accounted for around 10% of the victims. In a study from South India it was observed that labourers constituted the largest group accounting for around 30% of the victims whereas those employed in service and students followed with 22% and 16% of the victims respectively. In another study students formed the largest group of the RTA victims followed by the group comprising of the people working as labourers (Mehta, 1968). The reason may be

that people with sound socioeconomic background have more accessibility to private transports like bikes, cars etc hence more on roads and so more exposed to road vulnerabilities. Among the road traffic accident victims the major category of road user was that of drivers 142 (44.9%) followed by pedestrians 100(31.6) and passengers 74(23.4%). Similar pattern was also observed in studies from other parts of the country (Sathiyasekaran,1991 4) ((Jha Nilambhar *et al.*, 2003).

Among the drivers injured in RTAs 35 were bicyclists who did not require a license and out of the remaining, only 55.5% (n=108) had a valid driving license. However proportion of drivers without driving license is quite high compared to studies from Delhi and South India (Jha Nilambhar *et al.*, 2003) (Mehta, 1968). The reason could possibly be good socioeconomic background, so the easy accessibility of vehicles and the casual attitude of drivers towards obtaining licenses. Motorized two wheelers 146 (31.7%) and four wheeled LMVs 134(29.1%) were the most common vehicles involved in RTAs. Furthermore it was observed that Vehicle occupants constituted the vast majority (68%) of the victims in this study where 45% were drivers including bicyclists and 23% constituted passengers. Similar results were reported from Haryana and Aligarh where it was found that motorized two wheelers were the commonest among the vehicles involved in traffic accidents (Mishra Badrinarayan *et al.*, 2010) (Dhingra *et al.*, 1991). However bicycles followed by trucks and buses were reported as the major vehicles involved in few studies from other parts of the country (Jha Nilambhar *et al.*, 2003) (Ghosh, 1992). The reason for this could be the differentness in the availability and accessibility of public and private transport facilities throughout the country. The reason for major involvement of motorized two wheelers in traffic accidents could be the less stability of the vehicle and the high pick up speed that can be attained over short distances.

Protective Gear was used by only 31% (32) drivers while none of the passengers used any form of protective gear. Overall around 80% of vehicle occupants did not use any form of protective gear. In the study from South India it was reported that none of the victims used any protective gear ((Jha Nilambhar *et al.*, 2003). Trucks and Light Motor Vehicles were responsible for majority of pedestrian injuries 67% (67) followed by buses 13% (13), motorized two wheelers 10%(10) and Three Wheelers 9%(9). Most of the pedestrians were injured while they were simply walking on road 53(53%) followed by those who were injured while crossing the road 25 (25%). It was further observed that most of the pedestrians were injured while they were walking or running on wrong side of the road 47(78.3%) lack of sidewalks along with ignorance on part of the pedestrians could be the reasons for the risky behaviour of the pedestrians. Cell phone use at the time of RTA was reported in only 38(12%) of victims. Majority of the accidents occurred on weekdays 237(75%) with major peaks during Tuesdays 65(21%) and Wednesdays 51(16%) followed by 79(25%) only on weekends. Of the total accidents 79(25%) on weekends, 48(60.8%) occurred on Saturdays whereas 31(39.2%) on Sundays. Similar pattern was observed by misra *et al.* however different pattern was reported from Delhi (Mehta, 1968) (Mishra Badrinarayan *et al.*, 2010).

The reason could be that on Mondays and Saturdays there is maximum movement of vehicular traffic on roads because of increased inter-district movement of people as majority of them move to there original residences on weekend and return back to there work-places to stay put for the rest of the days. Majority of accidents occurred in the second quarter 100(32%) of the year whereas the first quarter experienced the least 51(16%) accidents followed by the third and the fourth quarters which experienced almost the same number of accidents 84(26%) and 81(25%) respectively. Moreover most of the RTAs occurred on clear & sunny days 180(57%) followed by cloudy days 80(25.3%). It was raining at the time of accident in 28(8.9%) and snowing in 6(1.9%) cases. The results however differed from other studies (Jha Nilambhar *et al.*, 2003) (Mehta, 1968) (Ghosh, 1992). The possible reasons for the variation could be the different topography and the seasonal variations. Winters are very harsh and long here compared to other parts of the country. In addition the state administration shifts its base to the winter capital so the employees, school and colleges are closed for winter vacations. Therefore movement of people on roads are reduced and moreover people prefer to stay indoors. The scenario is quite opposite in the summers here. There is heavy tourist rush from relatively hot summer places to this valley and in addition all offices , schools, colleges are open and the Darbar also is stationed here adding to the traffic load on the roads.

Majority of the accidents 122(39%) occurred between 4 to 8 pm followed closely by those occurring between 8 to 12 am, 120(38%). Minimum accidents were noticed between 4 to 8 am, 7(2%) and 8 to 12 pm, 12(4%), whereas almost negligible accidents 2(0.6%) occurred between 12 to 4 am. Similar results were reported by others as well (Mishra Badrinarayan *et al.*, 2010) (Jha, 1997). The reason could be that these hours are heavy traffic hours as commuters go to or return back from offices schools, tuitions, and business establishments. The surface condition of the roads at the site of RTAs in 161(51%) of cases was good and well maintained whereas in 155(49%) cases it was rough and poorly maintained. Furthermore Most of the RTAs occurred on main roads 191(60.4%) followed by highways 37(11.7%), crossings 32(10.1%), by lanes 30(9.5%) and intersections 24(7.6%) while as most of them occurred on the macadamized roads 292(92.4%) whereas very few were reported from semi pucca gravel roads and kucha earthy roads. This may reflect better road connectivity in the state.

Ply-worthy roads are considered a prerequisite for effective prevention of RTAs (Verma,2004). There is a dire need of proper road engineering, proper and timely maintenance of roads and provision of safe pathways for pedestrian population so as to make roads more safe and less prone to causing accidents. More than half of the vehicles 265(57.6) involved in RTAs appeared in bad condition and poorly maintained whereas 195(42.4%) in good condition and well maintained. Similarly Mishra *et al.* in their study found that 66% of the vehicles involved in RTAs were old and ill-maintained (Mishra Badrinarayan *et al.*, 2010). The most common mode of accident observed in the study was collision 135(42.7%) followed by knocked down 95(30.1%) and falling down 35(11.1%). Overturning of the vehicle and run over were reported in equal number of RTAs 15(4.7%) whereas 9(2.8%)

reported hitting an object as the mode of accident. Jha n found that the commonest mode of sustaining injury was knocked down by a vehicle followed by collision and falling down (Jha, 1997).

Speed could be the reason. Speed limits have been set here for different road locations and people need to strictly follow them (traffic police headquarters J&K, Srinagar order No:183 of 2010 dated 12-10-2010). The most apparent cause of RTA in the opinion of the victims was unsafe acts of the driver 287(90.8%) and unsafe conditions of the road 148(46.8%), followed by unsafe condition of vehicle 60(18.95) and bad weather condition 50(15.85). The reason for this may be that in most of the traffic accidents fault of any driver on road can jeopardize life of others even if they may commit no mistake on road either as drivers or passengers or pedestrians. this reinforces the famous dictum that says, watch others while you drive. Of course properly designed and constructed roads play a great role in prevention of road traffic accidents. Furthermore the more important part is the upkeep and timely maintenance of the roads.

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