

A Community-based Epidemiological Study on non-fatal Road Traffic Accidents in Puducherry, South India

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Abstract:


Introduction: Road traffic accidents are the sixth leading cause of death in India with a greater share of hospitalization, disabilities, deaths and socio-economic losses. **Objective:** To identify the pattern of non-fatal road traffic accidents, socio-demographic profile of accident victims and antecedent factors influencing these road traffic injuries. **Method:** A cross-sectional study was conducted for six months in Puducherry. From existing 27 wards of Lawspet, six wards were selected by simple random sampling technique and all the households in selected wards were included. The minimum required sample size was estimated to be 165 by considering prevalence of non-fatal road traffic accidents in Puducherry as 5.6%. Face-to-face interview with a semi-structured questionnaire was used for data collection. Data entry and analysis were performed using Epi-data manager 4.2.0. **Results:** Total 169 accident victims were included in the study from the households of selected wards. Mean age of the accident victims was found to be 36.2 (11.4) years. Two-wheeler accidents accounted for 144 (85.2%) and 123 (72.7%) accident victims were drivers at the time of accident. Majority (95.1 %) of the victims did not wear helmet while driving two-wheelers and none of the four-wheel drivers/pillions wore seat belts. Majority of the accidents occurred on usual tar roads 116 (68.6%) and 42 (24.9%) on highways. 102 (60.4%) accidents occurred in bi-directional roads. **Conclusion:** Simple or minor injuries were high compared to serious injuries requiring hospitalization. Majority of the accidents occurred during Fridays, Saturdays and Sundays. The accidents exhibited a bimodal distribution with day and night time.

Key Words: Epidemiology, Injury, Road Traffic Accident

Introduction:

Road traffic accidents (RTAs) are a major public health concern globally especially in low-and middle-income countries. One-fifth of fatalities due to road traffic accidents occurred in South Asia and road traffic injuries are projected to increase by 144% by 2020. ^[1]India with rapid urbanization coupled with

surge in motorization has resulted in 8% increase of road traffic fatalities annually for the last ten years and show no signs of decreasing trend. ^[2]The National Crime Records Bureau (NCRB) has reported highest rate of accidental deaths per lakh population in Union territory of Puducherry. ^[3,4]The increase in number of road traffic injuries were attributed to rapid rise in vehicle density on roads, poor adherence to traffic

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rules and regulations, poorly maintained and congested roads.^[5] Human, vehicular and environmental factors play roles before, during and after a trauma event therefore accidents have to be studied in terms of an epidemiological model (agent, host and environmental factors) and analysed in relation to time, place and person distribution.^[6] Most of the existing literature were all hospital-based and some being record-based studies.^[6,7] With this background, the objective of this study was to identify the pattern of road traffic accidents, socio-demographic profile of accident victims and antecedent factors influencing these road traffic injuries in Puducherry, South India.

Method:

A community-based, cross-sectional study among road traffic accident victims was conducted from March to August 2019 (six months) in Lawspet, one of the most densely populated urban constituencies in Puducherry district, South India.^[8] Lawspet was selected as the urban health training centre the medical college has been located in that area. In this study, the definition of an adult was considered as any individual who had completed 18 years of age.^[9] Operational definition of road traffic accident was contemplated as "an accident which occurred or originated on a way or street open to public traffic; resulted in one or more persons being injured, and at least one moving vehicle was involved."^[10] The definition of serious injuries were fractures, severe general shock requiring medical treatment and any other serious lesions entailing admission in hospital for more than 24 hours.^[10] Whereas, the simple injuries were all injuries not mounting to serious injuries or where hospitalization in less than 24 hours. As per World Health Organization (WHO), simple injuries and serious injuries have a recall period of three and twelve months respectively.^[10] Therefore, the inclusion criteria for study participants was individual residing in Lawspet (during the period of recruitment – six months) who had met with a road traffic accident within three months from the day of household visit. Death due to road traffic crashes,

repeat accident to the same individual in the past three months, victim not giving consent were excluded from the study.

The minimum required sample size was estimated to be 165 by considering prevalence of non-fatal road traffic accidents in Puducherry as 5.6%^[12] with absolute precision as 4% and a non-response rate of 20% in the formula $N=4pq/d$ ^{[2] [13]} From existing 27 wards of Lawspet, six wards were selected by simple random sampling technique using lottery method and all the households in selected wards were included.

All the households in the selected six wards were visited at least twice during data collection period. Households that were found locked on first or second visit; an additional visit were made to those households within two weeks. Households that were found locked in all three visits were excluded. Approximately 20,000 populations was screened for non-fatal road traffic injuries among the six wards. A pilot tested, face validated, semi-structured questionnaire consisting of questions related to socio-demographic profile, type and pattern of road traffic accident, hospitalization details was employed for data collection. Face-to-face interviews were conducted among adult victims whereas those victims who were ≤ 18 years data was collected from head of the family and/or mother of the victim. Adult victims were asked to give written informed consent. Written informed consent was obtained from guardian and parents if the accident victim was ≤ 18 years. Also, written informed assent was sought accident victims ≤ 18 years. Ethical clearance for this study was received from the Institute Ethical Committee (No. IEC/PP/2017/41). Data entry and analysis was performed using Epidata software. Descriptive data were represented as mean \pm SD or median (IQR) for numerical variables. Percentages and proportions for categorical variables were used. Appropriate tests of significance, Chi-square test or Fisher's exact test was applied to find the association between the injury types and socio-demographic determinants. Values of $p < 0.05$ was considered to be statistically significant.

Results:

A total of six wards of Lawspet was covered in this study. Around 20,000 population was screened to find the non-fatal injuries within past three months from the time of data collection. A total of 169 accidents victims were identified in the house-to-house survey. The Table 1 depicts socio-demographic profile of road traffic accident victim and their head

of the family respectively. Around 56 (33.1%) road traffic accident victims belonged to age group 34-43 years, 50 (29.5%) in 24-33 years; 23 (13.6%) in 44-53 years and in 14-23 years; 15 (8.8%) in ≥54 years. This study observed that the mean (SD) age of the accident victims to be 36.2 (11.4) years. The mean (SD) of number of family members was found to be 3.7 (1.1).

Table 1 : Socio-demographic profile of road traffic accident victims (N= 169)

Socio-demographic variables	n(%)
Gender	
Male	146 (86.4)
Female	23 (13.6)
Marital Status	
Married	125 (74.0)
Single/Widowed/Separated	44 (26.0)
Education	
No formal education	4 (2.4)
School level (1-12 class)	117 (69.2)
Graduate & above	48 (28.4)
Occupation	
Unemployed/Housewife	20 (11.8)
Unskilled	34 (20.1)
Semi-skilled	20 (11.8)
Skilled	39 (23.1)
Clerical/shop/farm	9 (5.3)
Semi-professional	18 (10.7)
Professional	29 (17.2)
Socio-economic status (Modified Kuppaswamy classification 2019)	
Upper middle class	62 (36.7)
Lower middle class	52 (30.8)
Upper lower class	55 (32.5)
Religion	
Hindu	156 (92.3)
Christian	10 (5.9)
Muslim	3 (1.8)
Type of family	
Nuclear family	148 (87.6)
Joint family	11 (6.5)
Other family types	10 (5.9)

Table 2 : Distribution of accident victims based on role of victim, mode of transport, type and direction of road (N= 169)

Variable	n(%)
Role of victim	
Driver	123 (72.7)
Occupant	30 (17.7)
Pedestrian	16 (9.5)
Mode of transport	
Two-wheeler	144 (85.2)
Three-wheeler	4 (2.4)
Four-wheeler	5 (3.0)
Pedestrian	16 (9.5)
Type of road	
Highway	42 (24.9)
Usual tar road	116 (68.6)
Mud road	11 (6.5)
Direction of road	
One-way	33 (19.5)
Bi-directional	102 (60.4)
Junction	34 (20.1)

Table 3 : Distribution of victims based on hospitalization, injury type and place of treatment (N= 169)

Variable	n(%)
Hospitalization	
Yes	43 (25.4)
No	126 (74.6)
Duration of hospitalization (n=43)	
<24hours	27 (62.7)
≥24 hours	16 (37.2)
Type of injury	
With fracture	38 (22.5)
Without fracture	131 (77.5)
Severity of injury	
Serious	16 (9.5)
Simple	153 (90.5)
First aid	
Received	18 (10.7)
Not received	151 (89.3)
Place of treatment	
Government	119 (70.4)
Private	50 (29.6)

Table 4 : Association between injury type and treatment

Variable	Injury type		X ² value (p-value)
	Simple injuries	Serious injuries	
Occurrence of fracture			
Yes	22 (57.9%)	16 (42.1%)	60.566 (0.001) *
No	131 (100.0%)	0 (0.0%)	
Hospitalization			
Yes	27 (62.8%)	16 (37.2%)	51.480 (0.001) *
No	126 (100.0%)	0 (0.0%)	
First aid			
Yes	12 (66.7%)	6 (33.3%)	13.308 (0.003) *
No	141 (93.4%)	10 (6.6%)	
Place of treatment			
Government	118 (99.2%)	1 (0.8%)	34.927 (0.000) *
Private	35 (70%)	15 (30%)	
*Chi-square test, p-value < 0.05 considered significant.			

The road traffic accident victims were classified into different socio-economic class based on modified Kuppuswamy classification (2019).^[14] The median (IQR) income of the accident victims was INR 13000 (8000-20000) whereas it was INR 14000 (10000-20500) for the victims' total family.

It was observed that 37 (21.9%) of the accidents happened to be on Fridays, followed by 33 (19.5%) on Mondays, 30 (17.8%) on Saturdays and 19 (11.2%) on Sundays. The accidents recorded during day time (6:00am to 6:00pm) were 97 (57.3%) while 72 (42.7%) of the road traffic accidents took place during the night time. The distribution of accident victims based on role of victim, mode of transport, type and direction of road has been depicted in Table 2.

In the current study, excluding the 16 pedestrians, among 153 accident victims, 86 (56.2%) were under the influence of alcohol at the time of accident. Mobile usage during driving was reported in 17 (11.1%) at the time of accident. Out of 144 accident victims who travelled in two-wheelers, only 7 (4.9%) had worn helmet at the time of accident. Excluding the 16 pedestrians, among 153 participants, 5 had travelled in four-wheeler and

among those 5 victims none of them had worn seat-belts at the time of accident.

The Table 3 provides the distribution of victims based on hospitalization, injury type and place of treatment. Out of 169 study subjects, 147 (87.0%) had loss of working days as a result of the accident. The median (IQR) number of working days lost was 3 (2-5) days.

The Table 4 shows the association between the injury type and occurrence of fracture, hospitalization, receiving first aid and place of treatment. It was found to be statistically significant (p-value < 0.05). While, there was no association found between the injury type and socio-demographic factors.

Discussion:

The present study noticed that the mean (SD) age of the study participants was 36.2 (11.4) years. Majority of the study victims belonged to young and middle-aged population. This might be attributed to the fact that productive age group people tend to travel more than other age group people for work and other necessities. These findings were consistent with earlier study.^[5]

It was observed that the proportion of male accident victims were high in this study which was correlating with existing literature.^[5,15] Male dominance as road traffic accident victims could be attributed to the fact that males normally work outside the home and are the primary economic support for the family. Families face economic crisis when the primary economic earner is injured and hospitalized, leaving the family in a position where they need to spend money on treatment although their earnings have ceased or reduced.

In the current study conducted among 169 accident victims, majority of the accidents occurred during Fridays, Saturdays and Sundays. This trend could be possibly explained as Fridays, Saturdays and Sundays are the days tourists tend to flood Puducherry which makes it crowded. People celebrate weekends and possibly are in a hurry to go to various places to join their working places on the following Monday. These findings were consistent with a previous study where Saturdays and Sundays noticed maximum accidents.^[16]

The present study witnessed that 57.3% of the road traffic accidents occurred during the day time (6:00am to 6:00pm) and 42.7% of the road traffic accidents occurred during the night time (6:00pm to 6:00am), this bimodal distribution might be because school, college and work hours are reasonably staggered. The schools and colleges start around 8:00am and ends at 4:00pm; private offices open between 8am and 9am, government offices between 9:00am and 10:00am, and shops around 11:00am. Further, in the night time people would expect lower traffic volume levels and hence people drive faster at night. Most shops stay open until 9:00pm, and restaurants generally serve customers until 11:00pm. Similar result was reported from a study where the accidents were relatively constant between the hours of 10:00am and 6:00pm. The study also showed high number of accidents between 8:00pm and 11:00pm.^[17]

Amongst 153 accident victims excluding 16 pedestrians, 56.2% were under the influence of alcohol at the time of accident. Mobile usage during

driving was reported in 11.1% at the time of accident. Other studies from India have also established high proportion of drunken driving among the accident victims in their respective studies.^[18-20] Yet, these proportions from other studies were low when compared to the present study.

Out of 144 two-wheeler travelers, only 4.9% had worn helmet at the time of accident. Excluding the 16 pedestrians, among 153 participants, five had travelled in four-wheeler and among those five accident victims none of them had worn seat-belts at the time of accident. These findings were in contrast with other Indian studies where in the proportions of helmet and seat-belts usage was found to be better.^[19]

Among 169 participants, 25.4% were hospitalized as a result of the road traffic accident. Out of which 16 out of 24 victims (37.2%) were hospitalized for 24 hours or more who were considered to be serious injury victims as per the operational definition framed for this study. The mean (SD) duration of hospitalization was 7 (3.1) days and the median (IQR) duration of treatment was 8 (7-13.5) days. This current study found shorter hospital stays compared with other studies, which can be attributed to the fact that this study had only 16 serious injuries (9.5%) amongst 169 study subjects. Other Indian studies have shown higher rates of hospital admissions and longer duration of hospital stays.^[21,22]

The strength of the study is that it is one among the few community-based studies done on road traffic accident victims which gives the true estimates of the non-fatal road traffic accidents.

Limitation of the study: Only 169 accident victims and also households from only six selected wards were included in the study. Hence, the results obtained from this study can't be generalized. As the detailed regarding vehicle involved in the accident were not clearly sought from the participants the same was not incorporated in the study.

Conclusion:

In this study, majority of the study victims belonged to young and middle-aged population with

male preponderance. Majority of the accidents occurred during Fridays, Saturdays and Sundays. The accidents exhibited a bimodal distribution with day and night time. Accident was common with two-wheelers as compared to other vehicles. Few victims were hospitalized as a result of the road traffic accident and a very few had serious injuries in this study.

Declaration:

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Conflict of Interest: Nil

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