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ORIGINAL ARTICLE

A RETROSPECTIVE STUDY ON THE DEMOGRAPHIC, GEOGRAPHIC PROFILE AND TREND ANALYSIS OF FATAL & NONFATAL ROAD TRAFFIC ACCIDENT IN TRICHY CITY, TAMIL NADU

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ABSTRACT: Introduction: Each year nearly 1.3 million people die as a result of a road traffic collision with more than 3000 deaths each day and more than half of these people are not travelling in a car. More than half the people killed in traffic crashes are young adults aged between 15 and 44 years. **AIM:** To analyse the profile of road traffic accidents that happened in Trichy city during the year 2011. **OBJECTIVES:** 1. To analyse the burden of road traffic accident cases reported in Trichy city over a period of one year 2. To determine the age and gender profile of fatal and non-fatal accidents. 3. To study the distribution of road traffic accidents by time and season of occurrence. **MATERIALS & METHODS: STUDY DESIGN:** Retrospective study. **STUDY AREA:** Trichy city. The traffic police department of Trichy traffic police headquarters was approached. The investigator and guide approached the office of the chief of Trichy city traffic police. After clearly explaining the purpose of this study to the chief stating that the data collected is only for the research purpose and will not be used for any other purpose, the data was collected. All the collected data were then entered in SPSS 17 and analyzed using the same software. Considering that the data were of categorical nature, descriptive statistics was used to describe the data. **RESULTS & CONCLUSION:** The fatal and non-fatal accidents follow a pattern in their incidence according to the week days and months in a year. However further in depth analysis is needed to analyse these pattern and to validate these findings. Overall the findings of this study will be useful for planning accident prevention programs in the future.

KEYWORDS: Road traffic accidents, Helmet use, Helmet safety, Driving rules.

INTRODUCTION: Each year nearly 1.3 million people die as a result of a road traffic collision with more than 3000 deaths each day-and more than half of these people are not travelling in a car.

Twenty to fifty million more people sustain non-fatal injuries from a collision, and these injuries are an important cause of disability worldwide. Ninety percent of road traffic deaths occur in low- and middle-income countries, which claim less than half the world's registered vehicle fleet.

Road traffic injuries are among the three leading causes of death for people between 5 and 44 years of age. Unless immediate and effective action is taken, road traffic injuries are predicted to become the fifth leading cause of death in the world, resulting in an estimated 2.4 million deaths each year. This is, in part, a result of rapid increases in motorization without sufficient improvement in road safety strategies and land use planning. The economic consequences of motor vehicle crashes have been estimated between 1% and 3% of the respective GNP of the world countries, reaching a total over $500 billion. Reducing road casualties and fatalities will reduce suffering; unlock growth and free resources for more productive use.(1)

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Trichy city is centrally located in Tamilnadu. It has excellent bus and train connectivity to almost all the districts of Tamilnadu. Trichy district suffers from very high incidence of accidents. Although the incidence of two wheeler and four wheeler accidents and the number of lives lost is very high in Tiruchi district, most of the two wheeler and four wheeler users are seem to be neglecting the driving safety rules. Even after very strict enforcement of law regarding the use of helmets and seat belt legislation, the vehicle drivers are negligent and reluctant to follow the driving safety rules. The incidence of road traffic accidents in Tamilnadu during the past 5 years is given in the Table 1. The number of vehicle population is increasing day by day in Tamilnadu. A report by Institute of Financial Management Research says that on an average 1,780 vehicles are being added to Chennai roads every day without a corresponding increase in motorable road space. The increase in number of vehicles adds further pressure on the traffic and is seen as an increasing cause of accidents and mental trauma. Further a report in Deccan Chronicle.[2] newspaper says that out of 446 two-wheeler riders who lost their lives in accidents in the Chennai city during the first eight months of 2012, 436 of them-accounting for 97.75 per cent -were not wearing helmets.[2–7]

The number of accidents and the number of fatalities due to road traffic accidents is increasing day by day. The common reasons for the accidents are very well known. But the general population is reluctant to follow certain safety measures that have to be followed during driving.[4–6,8,9]. The younger generation in particular is not willing to wear the helmets or seat belts while riding in two wheelers or four wheelers. Considering the number of fatalities that is occurring in the Trichy city due to accidents there is a need to study about the profile of road traffic accidents that happens in the Trichy city.

In this study, data regarding the accidents that happened in the Trichy city during the year 2011 was collected from the Trichy city traffic police department. This data was retrospectively analysed for studying their epidemiology.

AIM: To analyse the profile of road traffic accidents that happened in Trichy city during the year 2011.

OBJECTIVES:

1. To analyse the burden of road traffic accident cases reported in Trichy city over a period of one year.
2. To determine the age and gender profile of fatal and non-fatal accidents.
3. To study the distribution of road traffic accidents by time and season of occurrence.

MATERIALS & METHODS:

Study Design: Retrospective study.

Study Area: Trichy city-Bounded by the traffic police department segregated into Trichy city North and Trichy city south.

Duration of Study: 2 Months.

Sample size: 759 police records (103 Section 304 IPC + 656 Section 279,337 IPC).

Inclusion Criteria: All the available records pertaining to accidents during the year 2011.

Exclusion Criteria: None.

Choice of Subject: All the forms obtained from the traffic police department was analysed using SPSS and MS Excel 2010.

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Methodology and procedure employed: The traffic police department of Trichy traffic police headquarters was approached. The investigator and guide approached the office of the chief of Trichy city traffic police. They clearly explained the purpose of this study to the chief stating that the data collected is only for the research purpose and will not be used for any other purpose. The chief of traffic police was assured that anonymity will be maintained throughout the study. After meeting the chief of traffic police for more than 5 times he was finally convinced and he agreed to share the data with us. The data was obtained in the excel sheet format. This is the default mode of recording in the police department recording system. After doing necessary adjustments the data was imported into SPSS 17 and analysed using the same software. Considering that the data were of categorical nature, descriptive statistics was used to describe the data.

Informed Consent Procedure: The study was retrospective and does not involve patient intervention methods; hence, ethical issue does not arise.

RESULTS: Trichy city is divided into 2 administrative regions by the traffic police department of Trichy city. It is divided into Trichy North and Trichy south. But the data obtained from them was very limited and incomplete.

There were totally 110 deaths and 784 injuries during the year 2011 according to the police records. These 110 deaths were booked under Sec 304 IPC and 784 injuries were booked under Sec 279 IPC and Sec 337 IPC.

The police records depicted the following information:

1. Date of accident.
2. Area where accident took place.
3. Victim is a pedestrian or vehicle driver.
4. Details of the victim's vehicle and his contact details.
5. Details of the accused vehicle and his contact details.
6. Scenario in which accident took place.

The most common age group who fell as victims of road traffic accidents belonged to the economically productive age group of 21-40 years followed by 41-60 age group. Together they contribute 78.43% of total mortality due to road traffic accidents in 2011 in Trichy city (Figure1).

Figure 2 shows that males were the most predominant age group involved in fatal accidents contributing to 79% of the total mortality in 2011 in Trichy city. Single death accidents contributed to the major chunk of fatal accidents in the year 2011 amounting to 92.4% (Figure3).

The mortality was analysed in males and females stratified according to the gender. Again it was the males who predominate in each stratified age group (Table 2). The month wise mortality analysis showed that deaths were highest during the month of July, November and December with the mortality percentage of 10.48%, 11.43% and 11.43% respectively. Further the second position is occupied by the month of March (8.57%). The trend analysis showed that the mortality tends to increase from January to December with the peak mortality rates in the month of November and December (Figure 4). Further trend analysis with respect to mortality according to week days showed that mortality was least during Sunday (12.38%). Later during the start of the working days of the week mortality was highest with the values of 15.24% during Monday, Tuesday and

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Wednesday. Later during Thursday mortality reduces with 13.33% and further reduces during Friday (12.38%). Saturday there is a slight increase in mortality rate (13.33%) (Figure 5).

The Geographical distribution of the fatal accidents according to the traffic police administration division of Trichy showed that the accidents were almost equally distributed in North zone (48.6%) and south zone (51.4%) of Trichy city (Figure 6). The analysis of victims of the accident according to the vehicle they used showed that motorized two wheelers occupy almost half of the fatal accidents. Second most common victims are poor pedestrians (32.38%). Together motorized two wheelers and pedestrians constitute 79.05% of the total accident victims. (Figure 6). The most common type of vehicle accused of causing fatal accidents is the bus (32.38%). This is followed by the lorry and car which accounts for 20.95% and 20% of the accidents respectively. Motorized two wheelers also are responsible for a considerable number of fatal accidents (16.19%) (Figure 8).

INJURY PROFILE OF ACCIDENTS THAT HAPPENED DURING THE YEAR 2011 in TRICHY: Single injured person per accident is the most common type of accidents that occur in Trichy city with a percentage of 79.27% (Figure 9). The geographical distribution of the non-fatal accidents according to the traffic police administration division of Trichy showed that the accidents were almost equally distributed in North zone (46.19%) and south zone (53.81%) of Trichy city. There was a marginal increase in number of fatal and non-fatal accidents in the South zone compared to North zone (Figure 10). Trend analysis of non-fatal accidents according to days of the week showed increased incidence of non-fatal accidents during the weekdays Tuesday (15.7%), Wednesday (15.09%) and during the weekend Saturday (15.4%) (Figure 11). Trend analysis of the accidents according to the months in the year 2011 showed increased incidence of accidents during the month of March (10.67%), July (10.37%) and January (9.3%) (Figure 13).

The analysis of victims of the non-fatal accidents according to the vehicle they used showed that motorized two wheelers (43.29%) occupy almost half of the non-fatal accidents. Second most common victims are poor pedestrians (29.42%). Together motorized two wheelers and pedestrians constitute 72.71% of the total accident victims (Figure 14). The most common type of vehicle accused of causing non-fatal accidents is again the motorized two wheelers (43.29%). This is followed by the car, cycle and bus which accounts for 8.23%, 6.71% and 6.55% of the accidents respectively. (Figure 15)

DISCUSSION:

FATAL ACCIDENTS: The most common age group who fell as victims of road traffic accidents belonged to the economically productive age group of 21-40 years. This finding correlated with other studies which also showed higher mortality rates among the economically productive age group of 21 to 30 years.[10],[2],[11],[12] The most common victims of road traffic accidents are bread winners of a family and henceforth due importance must be given by the Government for prevention of road traffic accidents.

As expected males were the most predominant age group involved in fatal accidents the mortality was analyzed in males and females stratified according to the age group. Again it was the males who predominate in each stratified age group. This finding correlates well with other studies which have shown increased mortality among males compared to females.[13],[14],[10],[12] Generally males are the bread winners in a family. Owing to their work they travel a lot compared to women and hence forth they are the major victims and accused in accidents.

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Single death accidents contributed to the major chunk of fatal accidents in the year 2011. One assumption could be that drivers tend to be more rash and negligent when driving alone than when driving with his family. The month wise mortality analysis showed that deaths were highest during the month of July, November, December and March. Peak mortality rates during November and December could be attributed to the fact that in these months people take more vacation holidays and they tend to travel more. Leisure travel is something that involves travelling more in unknown roads. The trend analysis showed that the mortality tends to increase from January to December with the peak mortality rates in the month of November and December.

Further trend analysis with respect to mortality according to week days showed that mortality was least during Sunday. Later during the start of the working days of the week mortality was highest during Monday, Tuesday and Wednesday. Later during Thursday mortality reduces and further reduction is seen during Friday. Saturday there is a slight increase in mortality rate. The peak mortality rates during the start of the week days could be due to the fact that vehicular traffic tends to be more on days following a holiday. Further lower mortality rates during Sunday and Friday could be due to the fact that Sunday is a general holiday for all offices, educational institutions and companies and Friday is a religious holiday for the Muslim population. A point to note here is that Trichy city has a significant number of Muslim population. Rise in number of fatal accidents again during Saturday could be due to the fact that many people consume alcohol during Saturday night to relax themselves from their week's workload. This is a common custom in Indian culture and Trichy city is no exception to this culture.

The geographical distribution of the fatal accidents according to the traffic police administration division of Trichy showed that the accidents were almost equally distributed in North zone and south zone of Trichy city. A spot map of the accident sites could serve as a valuable analysis for this study but owing to limited time period it was not done. However equal distribution of accidents in both zones signifies that accident prevention and control measures should be targeted towards the entire Trichy city. The analysis of victims of the accident according to the vehicle they used showed that motorized two wheelers occupy almost half of the fatal accidents. Second most common victims are poor pedestria. This finding is similar to the findings in other studies which showed higher pedestrian casualty.[15],[16],[17],[12]

The most common type of vehicle accused of causing fatal accidents is the bus. This is followed by the lorry and car. Motorized two wheelers also are responsible for a considerable number of fatal accidents. A significant finding in this study is that in Trichy city most of the fatal accidents happen because of the rash and negligent driving by the bus drivers. There is a need for urgent control measures in this area.

NON FATAL ACCIDENTS: Single injured person per accident is the most common type of accidents that occur in Trichy city. The geographical distribution of the non-fatal accidents according to the traffic police administration division of Trichy showed that the accidents were almost equally distributed in North and South zones of Trichy city. There was a marginal increase in number of fatal and non-fatal accidents in the South zone compared to North zone. Equal distribution of accidents in both zones signifies that accident prevention and control measures should be targeted towards the entire Trichy city.

Trend analysis of non-fatal accidents according to days of the week showed increased incidence in non-fatal accidents during the weekdays Tuesday, Wednesday and during the weekend

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Saturday. This could be due to the increased vehicular traffic during weekdays and increased leisure activities during Saturday. This finding correlates with the trend analysis of death profile according to the week days. Generally on Sundays the frequency of accidents is less. This might be due to the fact that Sunday is a holiday and vehicle traffic is less during Sunday in the city. Trend analysis of the accidents according to the months in the year 2011 showed increased incidence of accidents during the month of March, July and January. Although trend analysis of fatal accidents showed that accidents increased from January to December, the trend analysis of non-fatal accidents showed a reverse trend. There was a decline in non-fatal accidents from January to December with peak incidences during January, March and July. Further research is needed in this regard.

The analysis of victims of the non-fatal accidents according to the vehicle they used showed that motorized two wheelers occupy almost half of the non-fatal accidents. This finding correlates with other studies on non-fatal accidents.[10] Second most common victims are poor pedestrians. This finding is similar to the findings of other studies which showed higher pedestrian injury[15][16][17][12]. Together motorized two wheelers and pedestrians constitute major chunk of the total accident victims. The most common type of vehicle accused of causing non-fatal accidents is again the motorized two wheelers.

CONCLUSION: In conclusion this study shows that the fatal and non-fatal accidents follow a pattern in their incidence according to the week days and months in a year. However, further in depth analysis is needed to analyse these patterns. Overall the findings of this study will be useful for planning accident prevention programs in the future.

Year	Total No. of Accidents	Total No. of lives lost due to accidents	% of increase of accidents
2006	55,145	11,009	12.80
2007	59,140	12,036	9.33
2008	60,409	12784	6.21
2009	60,794	13746	7.53
2010	64,996	15,409	12.10

Table 1: Year wise percentage of increase of accidents during the past 5 years in Tamilnadu

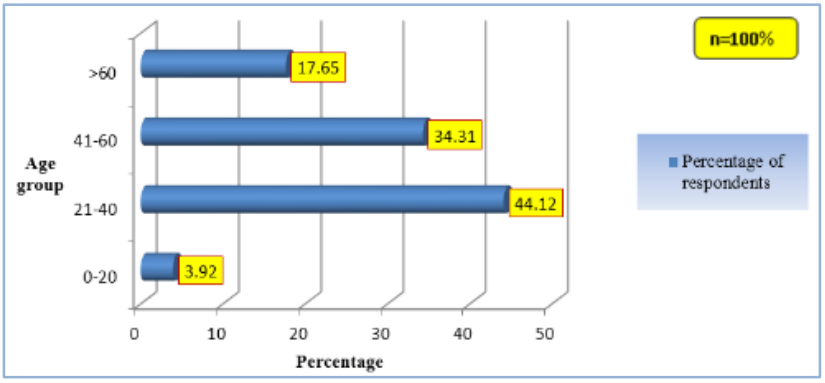

Fig. 1: Age wise percent distribution of victims

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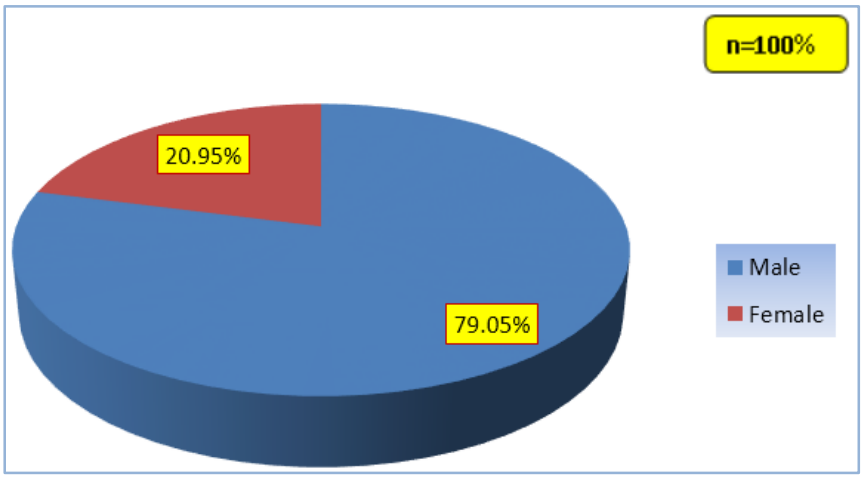

Fig. 2: Gender wise percent distribution of victims

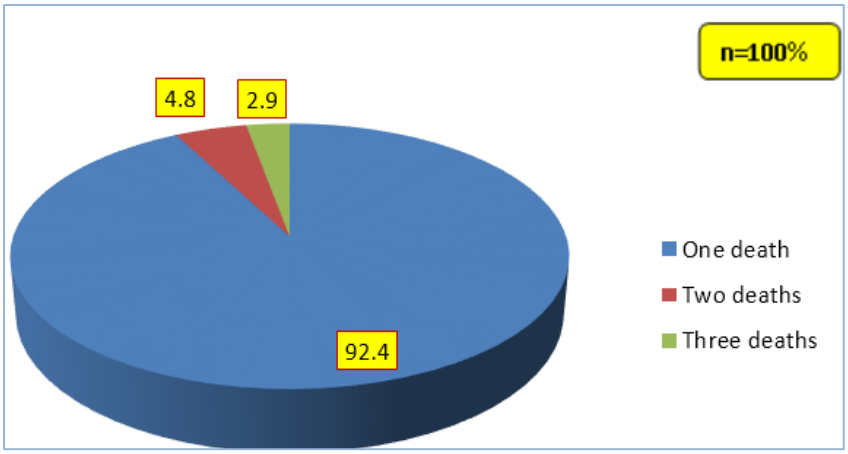

Fig. 3: Percent distribution according to the number of deaths involved per accident

		Sex wise distribution of victims		Total
		Male	Female	
Age wise distribution of victims	0-20	4	0	4
	21-40	37	8	45
	41-60	27	8	35
	>60	14	4	18
Total		**82**	**20**	**102**

Table 2: Age wise distribution of victims * Sex wise distribution of victims

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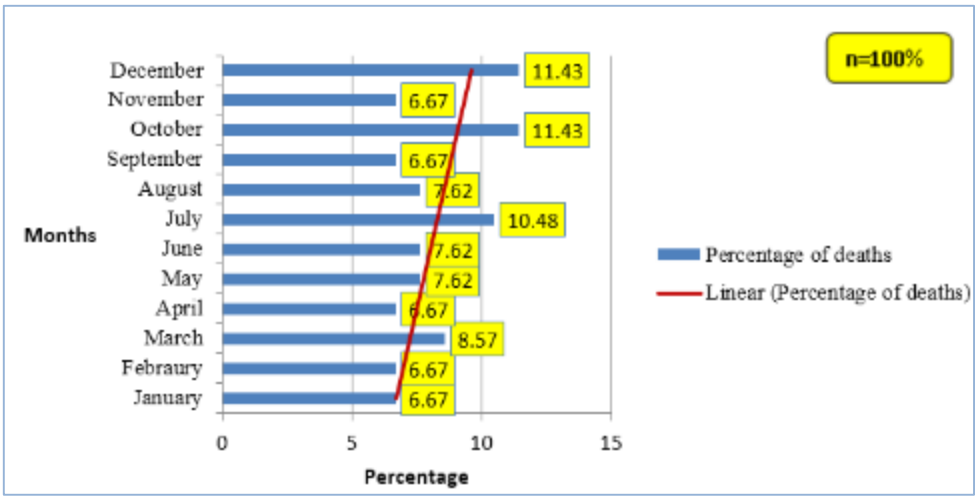

Fig. 4: Trend analysis and distribution of deaths according to the Months (2011)

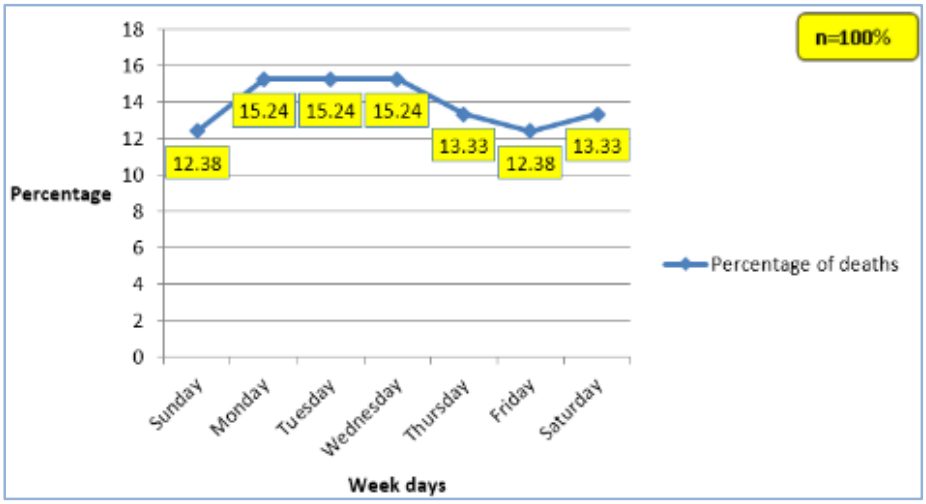

Fig. 5: Trend analysis of fatal Accidents according to the week days

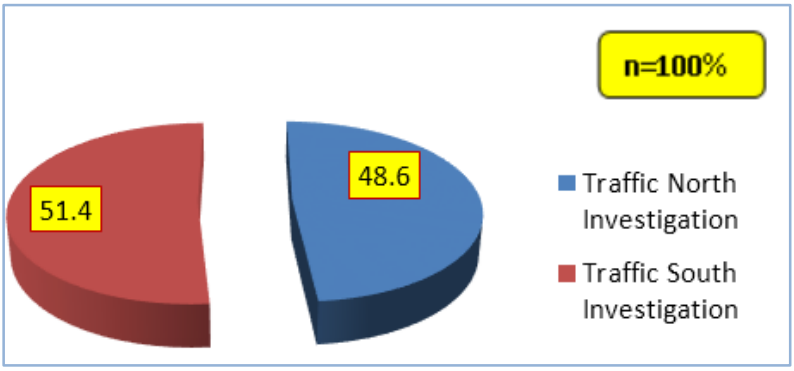

Fig. 6: Distribution of accidents in Trichy city With respect to traffic police boundary

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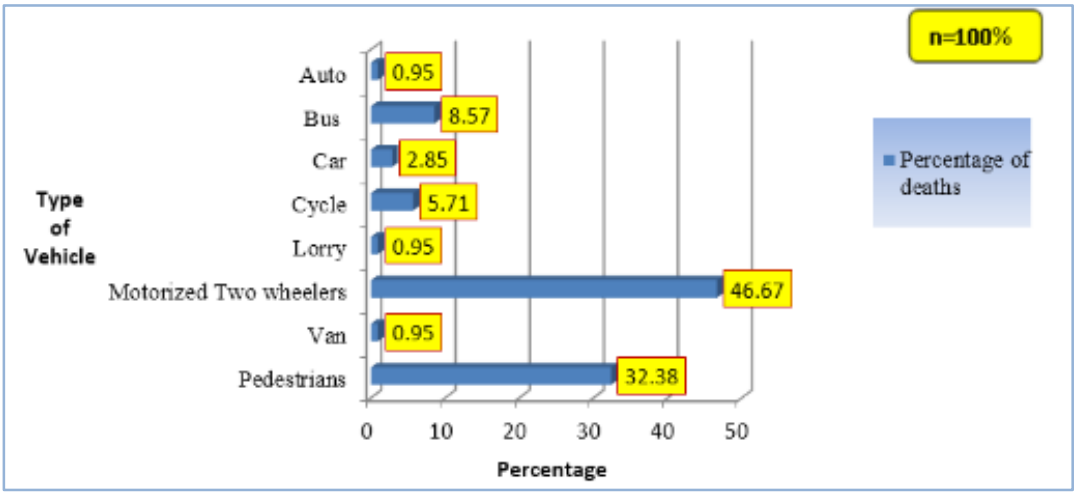

Fig. 7: Percent distribution of deaths according to the vehicle used by the victims

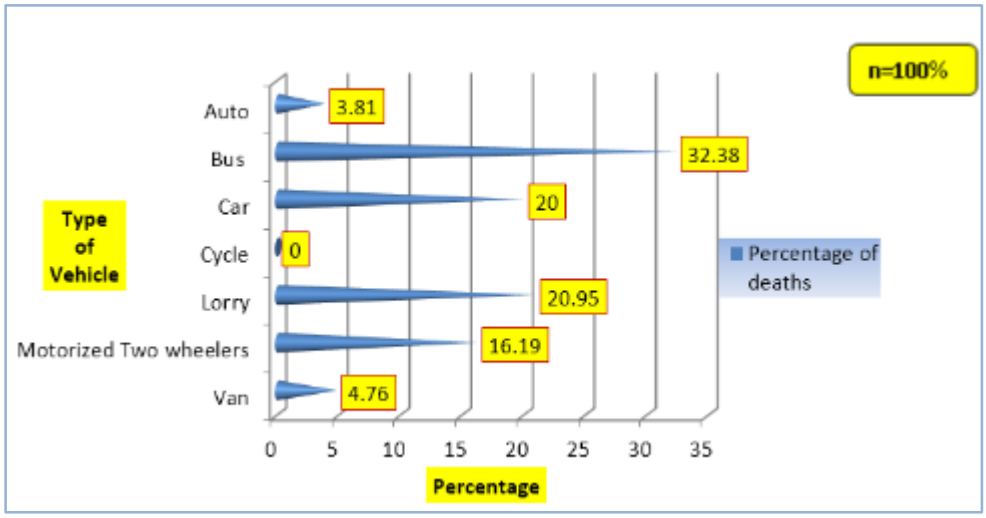

Fig. 8: Percent distribution of deaths according to the vehicle used by the accused

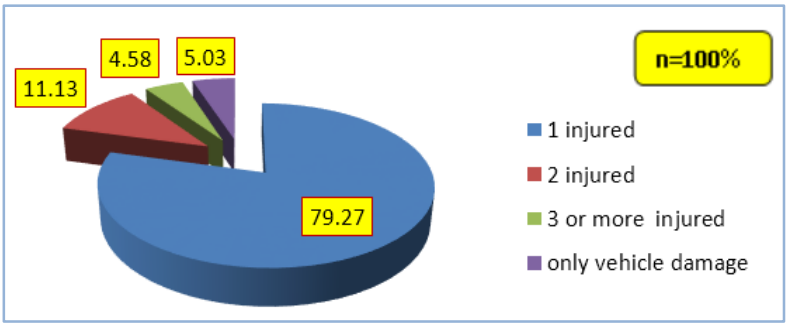

Fig. 9: Percent distribution according to the number of injuries per accident

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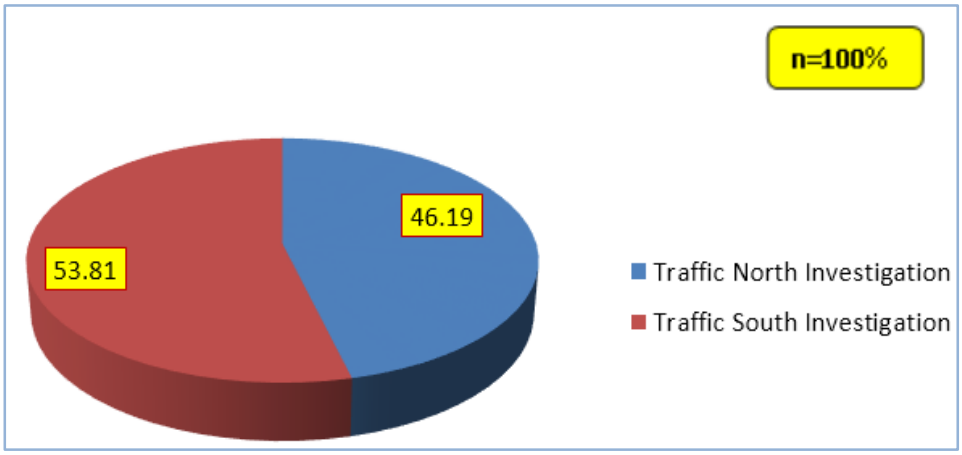

Fig. 10: Percent distribution of accidents according to Traffic police boundary limits for Trichy city

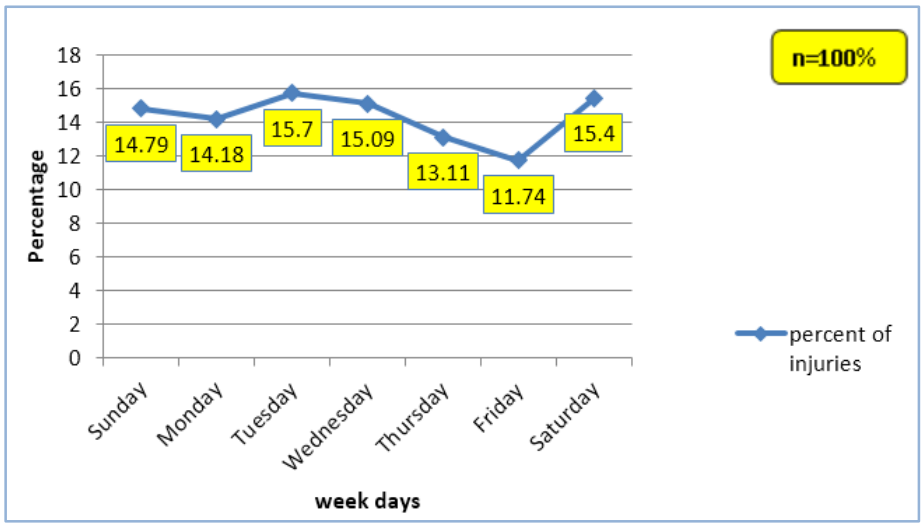

Fig. 11: Trend analysis of Non-fatal accidents According to the week days

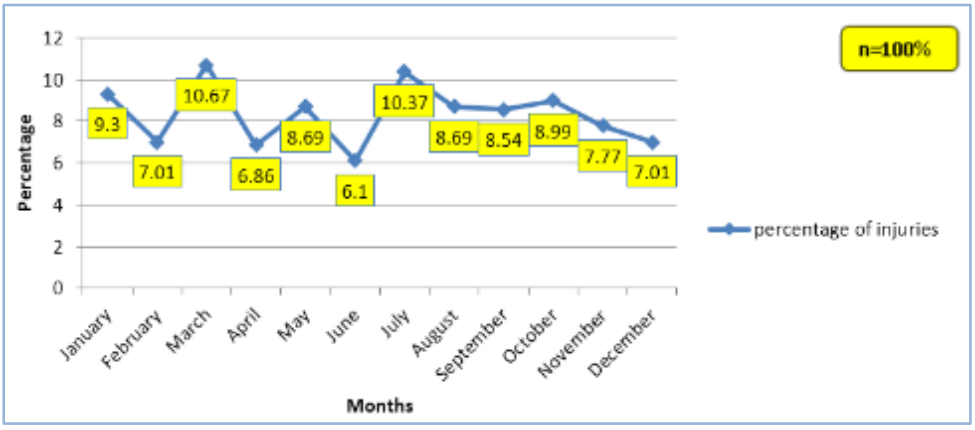

Fig. 12: Trend analysis of Non-fatal accidents According to the months

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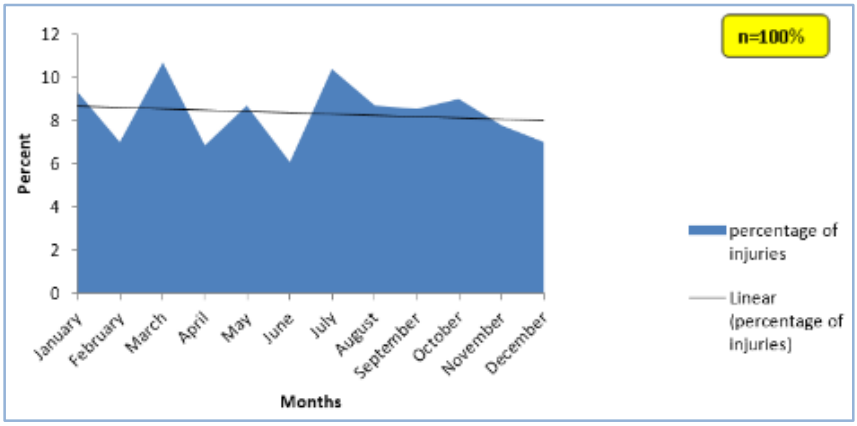

Fig. 13: Trend analysis of Non-fatal accidents according to the months

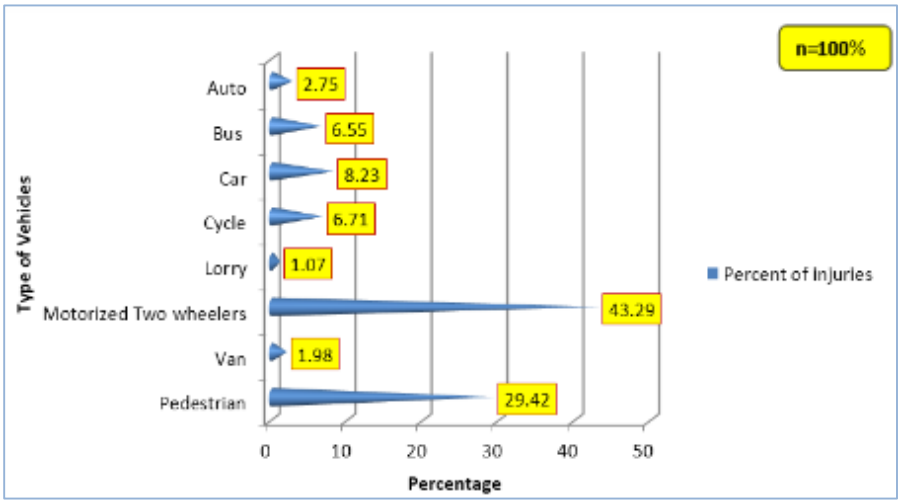

Fig. 14: Percent distribution of injuries according to the vehicle used by the victims

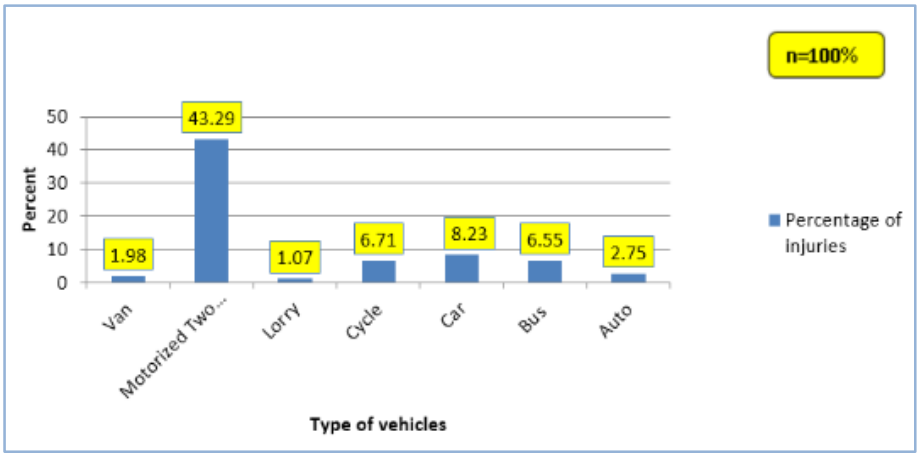

Fig. 15: Percent distribution of injuries according to the vehicle used by the accused

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