

## Pattern of injuries associated with deaths following Road Traffic Accidents as seen in a Tertiary Care Hospital in Puducherry

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### Abstract

**Background:** In India, for individuals older than 4-years of age, more life years are lost due to traffic accidents than cardiovascular diseases. In India over 80,000 persons die in the traffic crashes annually, over 1.2 million injured seriously and about 3,000,000 disabled permanently.

**Objectives:** To assess the pattern of injuries leading to deaths from road traffic accidents in a tertiary care hospital in Puducherry.

**Method:** It is a retrospective study of all medicolegal autopsies of road traffic accidents conducted between January 2015 to December 2015 at the Mortuary of Forensic Medicine Department, IGMC&RI, Puducherry, India.

**Results:** RTA accounted for 10.52% of the total cases. The highest number of victims of accidents were in the age group of 51-60 years with 32 cases (22.9%), followed by age group of 31-40 years. Male preponderance was seen in present study (85.7%) with a male female ratio of 6:1. Highest number of accidents is seen among the Hindus (94.3%) during evening hours (42.86%) maximum number occurring in the month of October (13.57%) and on weekends (40.71%). Motorcycles were the commonest vehicle involved (46.43%) and Pedestrians comprises highest number of casualties (46.43%). Abrasion (44.28%), Laceration (30.7%) and Contusions (20%) were the most common associated injuries. Most of the victims died of craniocerebral injuries (46.43%) and intracranial haemorrhages (33.57%).

**Conclusion:** Road Traffic accidents are one of the most common vehicular transport accidents involving the motorcycle where pedestrians are the casualties in most of the cases.

**Keywords:** Road Traffic Accident, Head injury, Fracture, Intra-cranial haemorrhages

### Introduction

Traffic accident fatality is reported as "Un-natural death" under section 174 CrPC and Police conduct an inquest in presence of two independent witness, and the Police submits the dead body for Medicolegal Autopsy to prove any causal relationship between the accident and death, and the determine the cause of the accident. WHO defined accident as an unexpected, unplanned occurrence that may involve injury.<sup>(1)</sup> The Global status report on road safety 2015 indicates that worldwide the total number of road traffic deaths has plateaued at 1.25 million per year.<sup>(2)</sup> India being one of the fastest developing nations in the world with a huge population density, the road traffic density is also increasing. In India, for individuals older than 4 years of age, more life years are lost due to traffic accidents than cardiovascular diseases.<sup>(3)</sup> In India over 80,000 persons die in the traffic crashes annually, over 1.2 million injured seriously and about 3,000,000 disabled permanently.<sup>(4)</sup> Half of the road traffic deaths occur most among "vulnerable road users" such as motorcyclists, pedestrians and pedal cyclists. Road traffic injuries are the leading cause of death among young people aged 15-19 years and cost the countries 1-3% of the gross domestic products.<sup>(5)</sup> Road traffic accident is any vehicular accident occurring on the roadway i.e. originating on, terminating on, or involving a vehicle partially on the roadways.<sup>(6)</sup> The present study was undertaken from the autopsy records of unnatural deaths that occurred in a leading tertiary care hospital in

Puducherry, to assess the pattern of injuries leading to deaths from road traffic accidents in a tertiary care hospital in Puducherry.

### Material and Methods

It is a retrospective study of all medicolegal autopsies conducted between January 2015 to December 2015 at the Mortuary of Forensic Medicine Department, Indira Gandhi Medical College & Research Institute (IGMC&RI), Kathirkamam, Pondicherry, India.

**Inclusion criteria:** All the registered medicolegal post mortem reports of road traffic accidents cases from January-2015 to December-2015.

**Exclusion criteria:** Post mortem reports other than road traffic accident cases.

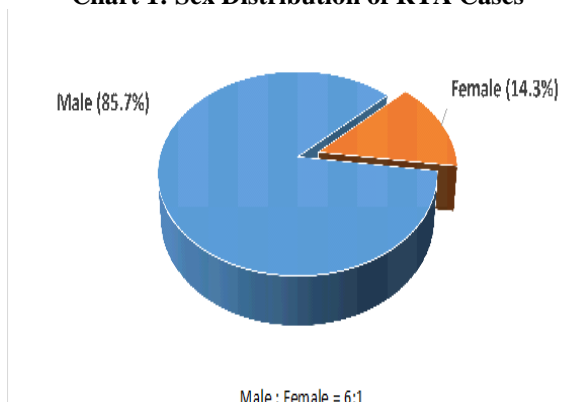
The required information like age and sex wise distribution, time of occurrence of accident, profile of the victims, type of vehicle involved and the pattern of cranio-cerebral trauma were studied from the post mortem reports. A detailed proforma for recording the details of road traffic accidents was prepared for filling the observations of the present study. The data thus obtained from this study were analyzed statistically by presenting the data in the form of appropriate Tables and Fig.

### Results and Observations

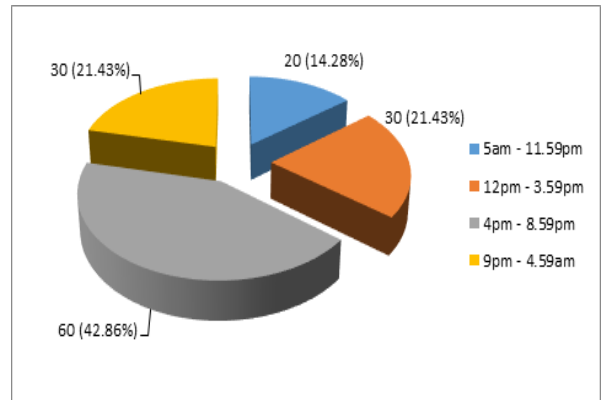
Out of the total of 1331 medicolegal autopsies conducted at the Mortuary of IGMC&RI, Puducherry,

India, during the study period the victim who died as a result of road traffic accident consist of 140 cases accounting for 10.52%. The age-wise distribution of road traffic accident is shown in **Table 1**, with the highest number of victims of road traffic accidents in the age group of 51-60 years in males with 28 cases (23.33%), and 31-40 years in females with 5 cases (25%) followed by age group of 31-40 years with 26 cases (18.6%), 21-30 age group and 41-50 age group with 22 cases (15.7%). There were 16 cases (11.4%) in the age group of 61-70 years, 9 cases (6.4%) in the age group of 11-20 years, 7 cases (5%) in the age group of 71-80 years, 4 cases (2.9%) in the age group of 81-90 years, and 2 cases (1.4%) in the age group of 0-10 years. Male preponderance was seen in the present study with 120 cases (85.7%) with a male female ratio of 6:1 (**Chart 1**). The highest number of road traffic accident is seen among the Hindus with 132 cases accounting for 94.3% of the cases, followed by the Christian with 5 cases (3.6%) and Muslims with 3 cases accounted for 2.1% (**Table 2**). In the present study road traffic accidents occurred mostly during the evening hours 4pm to 8.59pm accounting for 42.86% of the cases (**Chart 2**), followed by afternoon 12pm to 3.59pm and night time 9pm to 4.59am (21.43%). Least number of accidents occurred during morning 5am to 11.59pm accounting for only 14.28%. Maximum number of road traffic accidents occurred in the month of October (13.57%) followed by cases in the month of May (12.14%) and January (10.71%). The minimum cases were recorded in the month of December (3.57%) as shown in **Chart 3**. Majority of the accidents occurred on Sundays (21.43%) followed by Saturdays (19.28%), Thursday (14.29%), Wednesday (12.86%), Friday (12.14%), Monday (11.43%). The lowest was observed on Tuesday (8.57%) as shown in **Chart 4**.

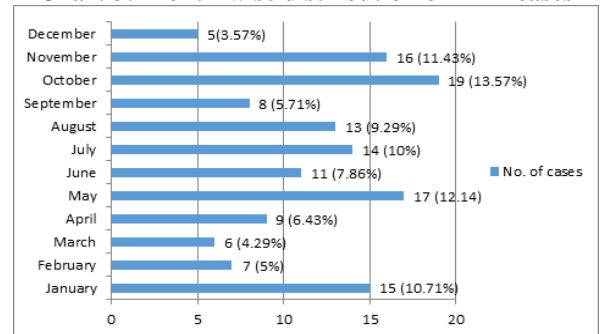
**Chart 1: Sex Distribution of RTA Cases**



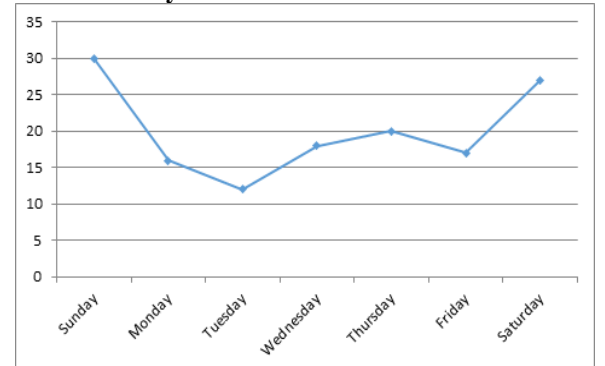
**Chart 2: Time of occurrence of road traffic accidents**



**Chart 3: Month-wise distribution of RTA cases**



**Chart 4: Day of the week in road traffic accident**



Among the different types of vehicles involved in road traffic accident, motorcycles were the commonest with 65 cases (46.43%) and majority of the victims were without helmets. It is followed by Heavy vehicles with 36 cases (25.71%), Light vehicles with 30 cases (21.43%), Self-fall from two-wheeler with 5 cases (3.57%), and unknown vehicles with 4 cases (2.86%). Among the type of road user's pedestrians were the highest number of casualties in road traffic accidents accounting for 65 cases (46.43%) followed by motorcycle rider with 56 cases (40%), Cyclist with 10 cases (7.142%), Pillion rider with 8 cases (5.714%), and 1 case of unknown victim (0.714%) of road traffic accident. In the present study, most of the cases of road traffic accident was in the highways with 67 cases

(47.86%), followed by the roads with 53 cases (37.86%), lanes with 18 cases (12.86%), and 2 cases (1.42%) was unknown. The majority of the victims died in the hospital accounting for 130 cases (92.86%). Only in 9 cases the victims died on the spot accounting for 6.43%. One victim died in the residence accounting for 0.71%. Head was involved in 131 cases (93.6%), which is followed by Chest (thorax) with 25 cases (17.85%), abdomen with 10 cases (7.1%), Lower Limb (7.14%), Upper Limb (10.71%) and Spinal injury (2.85%) as shown in (Table 2). Abrasion was the most common associated injuries accounting for 44.28% of the cases, followed by laceration accounting for 30.7% of the cases (Table-7). Other associated injuries include Fractures (18.57%), Crush injury to Abdomen (7.14%), and Crush injury to head (5.71%). In the present study among the intracranial haemorrhages, combination of sub-dural haemorrhage and sub-arachnoid haemorrhages were the most common accounting for 52.73% of the cases followed by sub-arachnoid haemorrhages alone and other combination each accounting for 27.27% of the cases, and combination of Extradural haemorrhages+Subdural haemorrhages+Subarachnoid haemorrhages with 6.4% of the cases (Table 3). Combination of Subdural haemorrhages+Subarachnoid haemorrhages+Intraventricular haemorrhages, Extradural haemorrhages+Subdural haemorrhages and Sub-dural haemorrhages alone accounted for only 2.72% of the cases each. Combination of Extradural haemorrhages+Subarachnoid haemorrhages and Subdural haemorrhages+Subarachnoid haemorrhages+Cerebellar haemorrhages accounted for 1.82% of the cases each and combination of Extradural haemorrhages+Subarachnoid haemorrhages and extradural haemorrhages alone was the lowest accounting for 0.90% of the cases each. In the present study, majority of the cases died due to cranio-cerebral injuries accounting for 46.43% of the cases, followed by intracranial haemorrhages (33.57%) and haemorrhage and shock due to multiple injuries (17.14%) and Cervical spine injury accounted for only 2.86% of the cases (Table 3).

**Table 1: Age and gender distribution of road traffic accidents**

Age Group (in years)	Male		Female		Total	
	Freq	%age	Freq	%age	Freq	%age
0-10	01	0.71	01	0.71	02	1.4
11-20	09	6.43	0	0	09	6.4
21-30	19	13.57	02	1.43	22	15.7
31-40	23	16.43	05	3.57	26	18.6
41-50	21	15	02	1.43	22	15.7
51-60	28	20	02	1.43	32	22.9
61-70	13	9.28	03	2.14	16	11.4
71-80	04	2.85	03	2.14	07	5
81 and above	02	1.43	02	1.43	04	2.9
Total	120	85.7	20	14.28	140	100

**Table 2: Profile of road traffic accidents**

Type of Vehicle involved	No. of cases	%age
Motorcycles	65	46.43
Heavy vehicles	36	25.71
Light vehicles	30	21.43
Self-fall from two-wheeler	05	3.57
Unknown vehicles	04	2.86
TOTAL	140	100
Type of Road Users		
Pedestrians	65	46.43
Cyclist	10	7.142
Motorcycle rider	56	40
Pillion rider	08	5.714
Unknown	01	0.714
TOTAL	140	100
Site/place of accidents		
Highways	67	47.86
Roads	53	37.86
Lanes	18	12.86
Unknown	02	1.42
TOTAL	140	100
Place of death		
Hospital	130	92.86
Spot	09	6.43
On the way to hospital	0	0
Residence	01	0.71
TOTAL	140	100
Body parts involved		
Head	113	80.71
Chest (Thorax)	25	17.85
Abdomen	10	7.1
Spinal Injury	04	2.85
Lower Limb	10	7.14
Upper Limb	08	10.71
Distribution of Religion		
Hindu	94.3	94.3
Christian	3.6	3.6
Muslim	2.1	2.1
Others	0	0

**Table 3: Pattern of associated injuries and cause of death**

Associated injuries	Freq	%age
Abrasion	62	44.28
Contusion	28	20
Laceration	43	30.7
Fractures	26	18.57
Crush injury head	08	5.71
Crush injury abdomen	10	7.14
Pattern of cause of death		
Cranio-Cerebral injury	65	46.43
Haemorrhage and Shock due to multiple injuries	24	17.14
Intracranial haemorrhages	47	33.57

Cervical spine injury	04	2.86
Total	140	100
<b>Pattern of Intracranial Haemorrhages</b>		
Extradural haemorrhage alone	01	0.90
Subdural haemorrhage alone	03	2.72
Subarachnoid haemorrhage alone	30	27.27
Extradural + Subdural + Subarachnoid haemorrhage	07	6.4
Extradural haemorrhage + Subdural	03	2.72
Extradural + Subarachnoid haemorrhage	02	1.82
Subdural + subarachnoid haemorrhages	58	52.73
Subdural + Subarachnoid + Cerebellar haemorrhages	02	1.82
Subdural + Subarachnoid + Intraventricular haemorrhages	03	2.72
Subarachnoid + cerebellar haemorrhages	01	0.90
Total	110	100

## Discussion

Road Traffic Accidents ranks first among all the accidents in the world. These trends of Road Traffic Accidents can be attributed to the increasing urbanization and tremendous growth of Road transport sector. In the present study, the incidence of Road Traffic Accidents during the study period was 10.52%. Similar findings were observed in the study done by Dhatarwal SK et al,<sup>(7)</sup> but our findings are not in agreement with the findings observed by Aggarwal et al<sup>(8)</sup> where they reported an incidence of 55.48% out of the total 602 cases autopsied in their centre.

Maximum number road traffic accident were male victims with 120 cases (85.7%) compared to 20 cases (14.3%) of female victims. Male preponderance was observed in the present study with a male female ratio of 6:1. These findings were consistent with the findings in India and abroad Singh YN et al,<sup>(9)</sup> Shetty BSK et al,<sup>(10)</sup> Dileep KR et al,<sup>(11)</sup> Mirza FH et al,<sup>(12)</sup> Gupta S et al,<sup>(13)</sup> Singh D et al,<sup>(14)</sup> Kalougivaki JJVP et al,<sup>(15)</sup> Swati S et al,<sup>(16)</sup> Saleem S et al,<sup>(17)</sup> and Madhuvardhana T et al.<sup>(18)</sup> Increased number of male victims were seen in all age groups and is similar to findings observed in other studies.<sup>(19,20)</sup> Male preponderance could be due to our Indian social structure of male taking the family responsibility and going out for work and the male tendency of rash, negligent driving or riding and breaking traffic rules and regulations. In comparison to the males the females in our Indian society are not engaged in outdoor activities most of the time.

The age span of 21-70 years constitutes 84.3% of all the fatal Road Traffic Accidents. These finding is in agreement with the findings of Swati S et al.<sup>(16)</sup> The maximum number of victims of Road Traffic Accidents are in the age group of 51-60 years with 32 cases (22.9%), followed by 31-40 years with 26 cases (18.6%), 21-30 years and 41-50 years with 22 cases (15.7%) respectively. These findings are in contrast to the

findings of Dileep KR et al,<sup>(11)</sup> Swati S et al<sup>(16)</sup> and Madhuvardhana T et al<sup>(18)</sup> where they observed 21-30 years as the most common age group. In males, the most common age group involved in Road Traffic Accidents were 51-60 years with 28 cases (20%), followed by 31-40 years age group with 23 cases (16.43%), 41-50 years with 21 cases (15%). Maximum number of female victims belonged to the age group of 31-40 years with 5 cases (3.57%), followed by 61-70 years and 71-80 years with 3 cases (2.14%) respectively. The lowest number of victim in both the sexes was in the age group of 0-10 years (1.4%). These findings are in contrast to the findings of others authors.<sup>(18,21,22)</sup> In the present study the maximum number of victims belonged to the age group of 51-60 years (22.9%), which is in agreement with the findings of Gissane W et al.<sup>(23)</sup> The reason for this could be due to the fact that old people are not fast enough to cross the roads and diminished vision due to old age could have contributed significantly in this regard.

Among the different types of vehicles involved in the Road Traffic Accidents in our study there were 46.43% motorcyclist involved in the accident. In Puducherry too, motorcycle is one of the most common mode of transport used by people nowadays which could be due to the higher speed achieving over short distances. The findings are similar to the study reported by other authors also<sup>(10,24)</sup> whereas some studies found four-wheeler as the most commonly involved vehicles.<sup>(16,25)</sup>

Among the road users the highest number of Road Traffic Accidents death occurred among the Pedestrians (46.43%). These findings are in agreement with the findings observed by other authors in their study.<sup>(12,16,25,26)</sup> Our findings are not consistent with the findings of Saleem S et al<sup>(17)</sup> where they observed least number of pedestrians (5.1%) were involved in road traffic accidents. The reason for the high number of pedestrian casualties in our study could be due to the fact that the footpaths are being used by hawkers to sell their goods and the pedestrians are forced to walk and cross the main busy roads with fast moving vehicles. Even the traders are found to have encroached on the footpaths to keep their products for sale. Recently the authorities have taken steps to clear the encroachment on the footpath in some vulnerable areas. That is a welcome step by the authorities in this regard.

Most of the road traffic accidents occurred during the month of October (13.57%) followed by the month of May (12.14%) and January (10.71%). The minimum number of accidents were recorded during the month of January. The study done by Singh D et al<sup>(14)</sup> recorded the maximum accidents in the month of November and the minimum recorded in the month of January.

The Maximum number of Road Traffic fatalities occurred during the evening hours (42.86%). Madhuvardhana et al<sup>(18)</sup> and Jha N et al<sup>(22)</sup> reported similar findings but the lowest number of accidents were reported during the night time, whereas in the present study the minimum number of deaths were recorded

during morning hours (14.28%). The peak increase in Road Traffic Accidents in the evenings could be due to reduced visibility, hurrying tendency of the people to reach home early, and traffic congestions during this peak hours. Majority of the Road Traffic Accident occurred on Sundays (21.43%) followed by Saturdays (19.28%). These finding is similar to study done by others.<sup>(18,22,27)</sup> The proportion of the accidents in the weekends was found to be 40.71%. Puducherry is a favourite tourist destination and many tourist come to spend their weekends here. Even people from the neighbouring state of Tamilnadu spends their weekends in Puducherry. In the present study self-fall accident was observed in 3.57% of the cases, whereas Kahn PS et al<sup>(27)</sup> found it to be 20.3% in their study which is slightly higher than our findings. Hindus constituted 94.3% of the victims of Road Traffic Accidents in our study, which is consistent with findings of other authors.<sup>(27)</sup>

Out of the 140 cases, the highest number of cases had injuries to the head (93.6%) followed by thorax (13.6%) and abdomen (7.1%). These findings are consistent with the findings of other authors<sup>(8)</sup> but a higher number of injuries involving the lower limb and upper limb were reported by these authors.

Abrasions were the most common associated injuries (44.28%), followed by Laceration (30.7%), Fractures (8.57%) and Contusions (6.43%) sustained by the Road Traffic Accident victims observed in our study. Other recorded associated injuries are Crush injury to the head, abdomen and Spinal cord dissection. Similar findings are observed by other authors.<sup>(8,16)</sup> Aggarwal et al<sup>(8)</sup> observed two cases of incised wound in their study whereas there was no such finding in our study. One case of spinal injury was recorded which is not consistent with our findings.

Majority of the Road Traffic Accident victims died in hospital (92.86%) and 6.43% of the cases died on the spot. Our findings are in contrast to the findings of Arif M et al<sup>(25)</sup> where they reported the largest number of victims (79.31%) died at the site of accidents. Only 18.96% of the victims died in the hospital. In the present study the highest number of Road traffic Accidents occurred on the highways (47.86%) followed by roads (37.86%) and lanes (12.86%). In two cases (1.42%) the place of accident was not known. These findings are in agreement with other authors.<sup>(28)</sup> The reason for this could be that most of the time the highways are busy with speeding vehicles especially during peak hours, but the volume of traffic in the lanes is comparatively lower.

Cranio-cerebral injuries was the most common cause of death accounting for 46.43% of the cases followed by Intracranial Haemorrhages (33.57%), Haemorrhage and Shock due to multiple injuries (17.14%) and Cervical spine injury (2.86%). Our findings are consistent with other authors.<sup>(29)</sup> These findings are not consistent with the study done by Singh H et al.<sup>(30)</sup> They also reported a slightly higher case of Cervical injury (12.9%) as compared to our study.

Among the pattern of intracranial haemorrhages, we observed higher number of combination of Subdural+Subarachnoid haemorrhages (58%), followed by Subarachnoid haemorrhages alone (27.27%). Our findings are in contrast to the findings of other authors<sup>(29,30)</sup> where they reported higher cases of subdural haemorrhages alone. Extradural haemorrhages accounted for only 0.90% of the cases in our study.

## Conclusion

A total of 10.52% incidence of Road Traffic Accidents was observed in our study. The incidence of Road Traffic Accidents has been on the rise with increasing urbanization and Puducherry is not an exemption as the number of vehicles on the road has grown many folds. Highest number of vehicular accidents was observed among the motorcyclist and majority of them were not wearing helmets. Strict implementation of rules for wearing helmets while riding two-wheeler will drastically bring down the number of fatalities in Road Traffic Accidents.

It may be concluded that pedestrians are the most vulnerable group in Road Traffic Accidents and probably the most common fatalities all over the world. Authorities should take sincere steps to see that the footpaths are free from any encroachment by traders and hawkers selling their wares. Anyone found breaking the law need to be penalized as precious human lives are at stake. Vehicle drivers too need to be more patient to allow elderly pedestrians to cross the busy main roads as they usually take more time to cross the roads. Being alert on the wheel and following traffic rules and regulations will go a long way to prevent vehicular transport accidents.

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## References

1. Hogarth J. Glossary of Health care terminology, WHO, Copenhagen. 1978.
2. World Health Organisation. Global status report on road safety. Geneva. WHO. 2015.
3. Mohan D. Road traffic accidents and injuries in India: Time for action. *Nat Medical Journal of India*. 2004;17:63-66.
4. Archana K. Sinha US et al. Fatal road traffic accidents study of distribution, nature and type of injury. *JIAFM*. 2005;27(2):71-76.
5. World Health Organisation. Road Traffic Injuries. Fact Sheet. 2013;N:358.
6. WHO ICD-10. International Statistical Classification of Diseases and Related Problem. 10<sup>th</sup> Revision; Volume 1. Geneva: World Health Organisation;891-943.
7. Dhatarwal SK, Rathee SK, Singh H. Pattern and distribution of fatal injuries in road traffic accidents in Haryana. *Medicolegal Update* 2004;4(4):111-14.

8. Aggarwal KK, Oberoi SS, Kumar R, Sharma M. Pattern and Distribution of Injuries in fatal Road Traffic Accident cases. *J Punjab Acad For Med Tox* 2009;9:71-75.
9. Singh YN, Bairagi KK, Das KS. An epidemiological study of Road Traffic victims in medicolegal autopsies. *J Indian Acad For Med* 2005;27(3):166-169.
10. Shetty BSK, Kanchan T, Menezes RG, Bakkannavar SM, Nayak VC, Yoganarasimha K. Victim Profile and Pattern of Thoraco-Abdominal Injuries Sustained in Fatal Road Traffic Accidents. *J Indian Acad Forensic Med.* 2012;34(1):16-19.
11. Dileep KR, Raju GM, Vijaynath V, Shanina. Deaths due to fatal Road Traffic Accidents A Retrospective study. *J Indian Acad Forensic Med.* 2013;35(3):236-238.
12. Mirza FH, Hassan Q, Jajja N. An autopsy based study of death due to Road Traffic Accidents in metropolis of Karachi. *J Pak Med Assoc.* 2013;63(2):156-60.
13. Gupta S, Monga S, Paul R, Dhingra R, Arora H, Kaur RH. A study of antecedent factors influencing the Road Traffic Accidents in Malwa Region of Punjab. *J Adv Med Dental Sci Res* 2014;2(4):7-14.
14. Singh D, Kumaran M, Satinder PS, Sonu G. Profile of Road Traffic Fatalities in Adults – A 40 years study in Chandigarh Zone of North West India. *J Indian Acad Forensic Med.* 2014;36(1):47-50.
15. Kalougivaki JJVP, Gounder RPS. Retrospective autopsy based study of fatal Road Traffic Accidents in Fiji. *J Forensic Res.* 2014;5:243.
16. Swati S, Mahesh J. Pattern of head injuries in Road Traffic Accidents - An Autopsy study. *Intl J Current Res.* 2015;7(12):23733-37.
17. Saleem S, Haider A, Jehanzeb K, Saleem T. Study of fatal Road Traffic Accidents: Based on Medico-Legal Autopsies. 2015;13(1):19-22.
18. Madhuvardhana T, Naveen N, Arun M, Balakrishna RAJ, Kagne RN. Profile of Road Traffic Accident cases in a Tertiary Care Hospital, Puducherry. *Intl J Rec Trends Sci Tech.* 2015;14(1):63-67.
19. Ameratunga S, Hajar M, Norton R. Road Traffic Injuries: Confronting disparities to address a global health problem. *Lancet* 2006;367(9521):1533-40.
20. Kanchan T, Menezes RG, Bakkannavar SM. Age and gender variations in trend of Road Traffic Fatalities. *Med Sci Law* 2010;50:192-6.
21. Karkee R, Lee AH. Epidemiology of road traffic injuries in Nepal, 2001-2013: Systematic review and secondary data analysis. *British Med J* 2016;6:1-7.
22. Jha N, Srinivasa DK, Roy G, Jagdish S. Epidemiological study of road traffic accident cases: A study from South India. *Indian J Com Med* 2004;XXIX(1):20-24.
23. Gissane W, Bull J. A study of motorway (M1) fatalities. *British Med J.* 1964;102:75-80.
24. Roshan TM, Jannathi LI. Study of co-variables among victims of road traffic accidents admitted to a tertiary care hospital. *Indian J For Com Med.* 2016;3(2):108-109.
25. Arif M, Ahmed M, Rasool SH. Road Traffic Accidents: Autopsy based study in Multan. *Professional Med J.* 2015;22(5):621-26.
26. Khichi Z, Afridi HK, Mateen A, Kahiri GQ. Audit of Thoraco-Abdominal Injuries in Road traffic Accidents in Larkana – Autopsy study. *Pak J Med Health Sci.* 2013;7(4):1109-12.
27. Kahn PS, Hussain RA. An epidemiological study of road traffic accident cases attending a tertiary care hospital, Tirupati. *IOSR J Dental Med Sci* 2015;14(9):38-43.
28. Kual A, Sinha US, Pathak YS, Singh A, Kapoor AK, Sharma S et al. Fatal Road Traffic study of distribution, nature and type of injury. *J Indian Acad For Med* 2005;27(2):71-76.
29. Panda S, Khaja S, Mohanty NK. A study on pattern of fatal injuries in road traffic accidents in coastal belt of Orissa. *J Indian Acad For Med* 2009;31(4):354-59.
30. Singh H, Dhattarwal SK. Pattern and distribution of injuries in fatal road traffic accidents in Rohtak (Haryana). *J Indian Acad For Med* 2004;26(1):20-23.