ORIGINAL ARTICLE (APMC – 493) DOI: 10.29054/APMC/18.493

Pattern of Injuries Sustained by the Vehicular Occupants during Road Traffic Accidents

Mushtaq Ahmed, Talha Naeem, Ummara Munir, Ahmad Raza Khurram, Altaf Pervez Qasim, Hira Anjum

ABSTRACT

Objectives: To study the pattern of injuries sustained by the vehicular occupants during road traffic accidents presenting to a tertiary care hospital, for the purpose of identification and treatment modalities. **Study Design:** Cross Sectional Study. **Settings:** Accident and Emergency (A&E) Department of Nishtar Hospital, Multan-Pakistan. **Duration:** Six months w.e.f. 1st January 2017 to 30th June 2017. **Methodology:** Total 152 cases were included in this study. In all cases of vehicular accidents, detailed history was taken from the injured patients / relatives & pattern of injuries were noted on predesigned proforma. **Results:** Mean age of the cases was 40.23±15.91. Out of 152 cases, 99(65.1%) were male and 53(34.9%) females. Position of occupant's / seating was as follows: Driver 66(43.4%), co-seat passenger 51(33.6/%) and rear seat passenger 35(23.0%). As regard distribution of injuries; 65(42.8%) suffered from head injury, 49(32.2%) sustained injuries to the upper extremity, 60(39.5%) patients got the trauma to lower limbs, injuries over the chest were observed in 69(45.4%) cases, pelvic injuries in 36(23.7%) patients and abdominal injuries were noted in 13(8.6%) cases. Stratification with regard to age, gender and position / type of seating was carried out. **Conclusion:** Our study shows that chest and head injuries remained the most common and serious type of trauma sustained by drivers and front seat passengers and the same is encountered in the emergency department of our hospital. The availability of good neurosurgical care is essential for these patients. This study will be beneficial in establishing the identity of driver & co-seat passenger from the occupants of rear seats.

Keywords: Road traffic accidents, Vehicular occupants, Pattern of injuries, Driver, Co-seat passenger, Rear seat passenger.

Corresponding Author
Dr. Talha Naeem
Assistant Professor, Forensic Medicine
Quaid e Azam Medical College,
Bahawalpur-Pakistan
Contact: +92 300-8681118
Email: drtalhacheema@gmail.com

Submitted for Publication: 28-05-2018 *Accepted for Publication: 13-08-2018*

Article Citation: Ahmed M, Naeem T, Munir U, Khurram AR, Qasim AP, Anjum H. Pattern of Injuries Sustained by the Vehicular Occupants During Road Traffic Accidents. APMC 2018;12(4):265-8.

INTRODUCTION

Road traffic accidents (RTAs) kill more than million persons per year (3000 per day) and accounting for injured and disabled between 20 to 50 million.[1] Ages between 15-44 years are most vulnerable group incurring 50% of all RTAs with a male predominance of 73%. By the year 2020, RTAs are envisaged as 2nd leading cause of death globally if road safety is not addressed adequately.[2] Injury prevention is an increasingly important component of healthcare policy in many developed countries, especially where limited resources are an important constraint.[3]

The vehicle traffic accidents have been widely studied in different countries, but the varying nature of traffic accidents in different countries was not profoundly investigated to set suitable protective strategies.[4]

World Health Organization[5] accepts road traffic injuries as main cause of death between the ages of 15-29 years globally, whereas for all age groups road traffic injuries stand at 9th level. Low and medium income countries face major brunt of traffic injuries with an escalation by each passing day. It is mainly due to rapid urbanization and motorization.[6] In India, RTAs claim loss of 1,50,000 lives per annum with severe disability mounting to 3.8 million.[7] In Pakistan, during the last decade, 1500 people succumbed to road traffic injuries per day.[8] According to another statistical data, the death rate in Pakistan due to RTAs is 15.5 per 100,000 which is significantly high.[9]

As far as the car accidents are concerned; (82%) victims of road traffic injuries in Guilan province of Iran were either car occupants or road users (bicyclist, motorcyclist or pedestrian) who got injuries due to collision with cars.[10] Another study in France has precisely shown that 56.3% of all the fatalities due to road traffic accidents were sustained by car occupants.[11] This statistical data indicates that pattern of injuries sustained by the car occupant's deliver very important information regarding treatment strategies and establishing the identity of seat occupants. Different researchers have studied these patterns which have provided useful information both for the health care providers and forensic experts.

Concentrating on cars, the pattern of injuries in vehicular occupants varies according to the position of the occupant.[1] Yang et al[12] in his study has found head injuries in 31.5%, lower extremity injuries in 32.8%, upper extremity injury in 9.4% chest and pelvis injuries in 13.5% and abdominal injuries in 6.2% occupants of cars injured in RTAs. As the car accidents are increasing in our country due to excess of vehicles and over speeding hence improvement in safety of vehicles and introduction of specific safety restraint devices for vital parts of body is need of the day. In un-attended and un-witnessed road

traffic accidents, the recognition of driver goes unnoticed and the onus of responsibility cannot be affixed leading to undesired complications in our social setup. The nature of injuries sustained by the occupants in motor car crashes is an area which demands further exploration pertaining to our local traffic densities, road conditions, car makers and prevalent models.
Thus, the rationale of this study is to determine the pattern of injuries in vehicular occupants of road traffic accidents which easily distinguish between driver / co-seat passenger from rear seat occupants. The results of this study will help the clinicians to design a proper management protocol for evaluation of the patients of RTAs in case of emergency.

METHODOLOGY

Study Design: Cross Sectional Study.
Settings: Accident & Emergency Department of Nishtar Hospital, Multan.
Duration: Six months (1st January, 2017 to 30th June, 2017).
Methods: Total 152 cases of RTAs were studied in detail. Sampling was done by non-probability consecutive sampling for all the car occupants of road traffic accidents who sustained injuries. A Performa was prepared and injuries on different body parts were recorded as given in subsequent tables. All bruises, abrasions, lacerations, incised wounds or fractures suffered by the injured person were labeled as injury. Those injured were included in the study that were alive and accompanied by some eye witness to help establish their identity and type of seating they were using at the time of accident. All those cases in which driver was dead, absconder or the body was mutilated as a result of fire or un-witnessed cases were not included.
Data was analyzed on SPSS version 20. Frequency and percentage were calculated for gender, type of seating (Driver/Co-seat passenger/Passenger), head injury, lower extremity injury, upper extremity injury, chest, abdominal and pelvis injury. Effect modifiers like age, gender, type of seating (Driver/Co-seat passenger/Passenger) were controlled through stratification. P-value <0.05 was considered as significant.

RESULTS

Total 152 cases were selected. Ages of the patients ranged between 18-70 y. Mean age was 40.23±15.91 years. Table 1 There were 99(65.1%) male injured persons while remaining 53(34.9%) were females. Position of occupants / type of seating was as follows: driver 66(43.4%), co-seat passenger 51(33.6/%) and rear seat occupants 35(23.0%) cases. Distribution of injuries was as follows: Head injury 65(42.8%), upper extremity injury 49(32.2%), injuries to the lower extremity observed in 60(39.5%) cases, chest injures found in 69(45.4%) victims, pelvic injuries in 36(23.7%) cases and abdominal injuries were noted in 13(8.6%) cases. Table 1
Stratification with regard to age / gender was carried out in Table-2 and 3 respectively while stratification according to position of occupants / type of seating was presented in Figure1.

Table 1: Summary

Category	Number	Percentage
Age Group		
18-30	57	37.5
31-55	59	38.8
55-70	36	23.7
Total	152	100.0
Mean±SD	40.23±15.91	
Gender		
Male	99	65.1
Female	53	34.9
Total	152	100.0
Position of Occupants / Type of Seating		
Driver	66	43.4
Co-Seat Passenger	51	33.6
Rear Seat Passenger	35	23.0
Total	152	100.0
Body part injured		
Head Injury	65	42.8
Upper Extremity Injury	49	32.2
Lower Extremity Injury	60	39.5
Chest Injury	69	45.4
Pelvic Injury	36	23.7
Abdominal Injury	13	8.6
Note: Total is more than 100% because of multiple responses		

Table 2: Pattern of injuries with respect to age groups

Body Part Injured	Age Group				
	18-30 years n=57	31-55 years n=59	55-70 years n=36	Total	P value
Head Injury	28 43.1%	23 35.4%	14 21.5%	65 100%	0.471
Upper Extremity injury	20 40.8%	14 28.6%	15 30.6%	49 100%	0.163
Lower Extremity Injury	23 38.3%	23 38.3%	14 23.3%	60 100%	0.985
Chest Injury	28 40.6%	24 34.8%	17 24.6%	69 100%	0.638
Pelvic Injury	11 30.6%	15 41.7%	10 27.8%	36 100%	0.595
Abdominal Injury	5 38.5%	5 38.5%	3 23.1%	13 100%	0.997
Total Multiple Injuries* *Does Not Stand true for no. of cases. Only denotes multiple injuries sustained in respective age group	115	104	73	-	
	Percentage= Multiple Injuries / n × 100				

Table 3: Pattern of injuries with respect to gender

Body Part Injured	Gender			
	Males n=99	Females n=53	Total	P value
Head Injury	40 61.5%	25 38.5%	65 100%	0.422
Upper Extremity injury	31 63.3%	18 36.7%	49 100%	0.739
Lower Extremity Injury	40 66.7%	20 33.3%	60 100%	0.748
Chest Injury	47 68.1%	22 31.9%	69 100%	0.481
Pelvic Injury	26 72.2%	10 27.8%	36 100%	0.307
Abdominal Injury	7 53.8%	6 46.2%	13 100%	0.372
Total Multiple Injuries* *Does Not Stand true for no. of cases. Only denotes multiple injuries sustained in respective gender group	191	101	-	
	Percentage= Multiple Injuries × 100 / n			

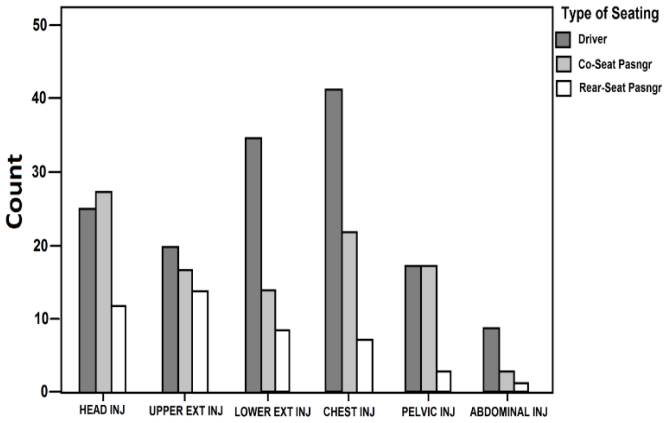


Figure 1: Pattern of injuries according to position of occupants / type of seating

DISCUSSION

The most common age group affected in the study was between 31-55 years (Table-1). This is the most active group which is meant to earn bread and butter for the family and henceforth, more vulnerable to come across accidents. But ironically when it comes to multiple injuries this is the least affected group as shown in (Table-2). This is due to the mature age and good health. In young age group (18-35) immature attitude and rush of blood are the factors causing multiple injuries, while for old age group (55-70) diminished reflexes and impairment of vision are the causative factors. Road Safety Authority [13] in Ireland states that young male drivers (17-25 years) are seven times more likely to be killed on roads than other road users. It has been observed that inexperience and risk taking are two factors that are associated strongly with collisions among young drivers.

The results indicate that the overwhelming majority of the victims (65.1%) were males. This predominance of males has been attributed to the fact that the drivers in our country are frequently males as they normally work outside the home and are primary income earners in the family leading to greater male exposure on urban streets. The higher incidence of traffic accidents among males was reported by Sulehri et al[14] in Faisalabad, Bhatti et al[15] in Rawalpindi and Jha et al[16] in Eastern Nepal. However, in developed countries like USA, male and females have equal access to vehicles and no significant male predominance observed by Ulfarsson and Mannering[17] in Washington State where 51.9% males suffered vehicular accidents as compared to 48.1% females. In our study no difference was observed in pattern of injuries with regard to gender (Table 3). Infrequent injuries in females are merely because of lesser number of females encountered road side accidents in our country resulting in overall decrease in each injury pattern.

This study recognizes that amongst the car occupants, 43.4% drivers' sustained injuries during a road crash owing to the steering wheel injuries, locking of the knee joint while applying hard brakes and wind screen injuries. This finding is comparable to the study of Mohammad zadeh et al[18] who has documented the involvement of 72.3% drivers in RTAs.

The study revealed that chest injuries sustained by the car occupants were the most common in 45.4% cases which is comparable to a study by Abu-Zidan et al[19] conducted in 2012 at UAE reporting 34.59% car occupants suffered from chest injuries. A decrease in incidence of chest injuries is attributed to better compliance of the road safety rules by the civilians, usage of the seat belts and better quality of vehicles in the Middle East. In the western world, the most common cause of death after sustaining trauma is severe head injury. The incidence of death from head injury is approximately 7 per 100,000 as reported by Finfer et al.[20] Drivers are the most vulnerable car occupants who can suffer injuries (Fig-1). Moreover, the importance of chest injuries as the commonest type sustained by drivers cannot be overemphasized. This finding is in consonance with Wisch et al[21] who maintained that thorax injuries were around 10% higher for occupants seated in the front than on the rear seats & on the basis of such injury patterns, one can identify driver and co-seat passenger from rear seat passengers.

CONCLUSION

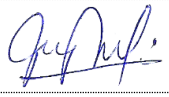
Chest and head injuries due to vehicular accidents remain the most common and serious type of trauma encountered in the emergency department of our hospital and the availability of good neurosurgical care is essential for these patients. A nationwide computerized trauma registry is urgently required to shed light on the risk factors, circumstances and the chain of events leading to the accidents.

This study will be helpful towards identification of drivers and co-seat passengers from rear seat occupants on the basis of difference in injury location / pattern, especially in those cases where all the occupants died and in the absence of eye witness, charge of criminal responsibility couldn't be fixed.

REFERENCES

1. Saukko P, Knight B. Knight's Forensic Pathology. Transportation injuries. 4th ed. Florida, USA: CRC Press, Taylor & Francis Group; 2016. pp 905-18.
2. Hajeeh MA. Traffic accidents in Kuwait: a decision-making analysis. Intl J Appl Math Inform. 2012;6(2):84-91.
3. Wallis LA, Greaves I. Injuries associated with airbag deployment. Emerg Med J. 2002;19:490-3.
4. Brand S, Otte D, Mueller CW, Petri M, Haas P, Stuebig T, et al. Injury patterns of seniors in traffic accidents: a technical and medical analysis. World J Orthop. 2012;3(9):151-5.
5. World Health Organization. Global status report on road safety. Geneva: WHO; 2015.
6. Staton C, Vissoci J, Gong E, Toomey N, Wafula R, Abdelgadir J, et al. Road traffic injury prevention initiatives: a systematic review and meta summary of effectiveness in low and middle income countries. PLoS One. 2016;11(1):e0144971.
7. Agrawal AK, Bishnoi M, Girish bhai PM, Vishnubhai PM, Pravin bhai PP, Vinod bhai PP. Epidemiological study on patients with road traffic accidents admitted in department of orthopaedics at a rural hospital in India (a retrospective study of more than 1000 patients). Int J Orthop Sci. 2018;4(1):23-6.
8. Chaudhry R, Javed M, Abid KJ. Epidemiological study of road traffic accidents attending orthopedic OPD of Ch. Rahmat Memorial Trust Hospital. PJMHS. 2017;11(1):168-71.
9. Gill UN. Epidemiology of orthopaedics fractures in under-developed country due to trauma, a retrospective study. JPOA. 2016;28(2):64-6.
10. Amiri ZM, Dastgiri S, Kiakalyeh AD, Imani A, Mollarahimi K. An epidemiological study of road traffic accidents in Guilan province, northern Iran in 2012. Bull Emerg Trauma. 2016;4(4):230–5.
11. Bouaoun L, Haddak MM, Amoros E. Road crash fatality rates in France: A comparison of road user types, taking account of travel practices. Accid Anal Prev. 2015;75:217-25.
12. Yang J, Otte D. A comparison study on vehicle traffic accident and injuries of vulnerable road users in China and Germany. In proceedings 20th international technical conference on the enhanced safety of vehicles. 2007; pp. 7-417.
13. Road Safety Authority (RSA). 'Road Collision Facts 2006' (RS 2). Road Safety Authority, Ballina, December 2007. Available at: http://www.nsc.ie/publication/publication/upload/RSA_RCF_.
14. Sulehri MA, Qasim AP. Road Traffic Accidents; Fatalities in Faisalabad. Professional Med J. 2011;19(2):180-6.
15. Bhatti MA, Ajaib MK, Masud TI, Ali M. Road traffic injuries in Pakistan: challenges in estimation through routine hospital data. J Ayub Med Coll Abbottabad. 2008;20(3):108-11.
16. Jha N, Agrawal CS. Epidemiological study of road traffic accident cases: a study from Eastern Nepal. Regional Health Forum WHO South-East Asia Region. 2004;8:15-22.
17. Ulfarsson GF, Mannering FL. Differences in male and female injury severities in sport-utility vehicle, minivan, pickup and passenger car accidents. Accid Anal Prev. 2004;36(2):135-47.
18. Mohammad zadeh M, Paravar M, Mirzadeh MA, Mohammad zadeh J, Mahdian S. Seat belt usage in injured car occupants: injury patterns, severity and outcome after two main car accident mechanisms in Kashan, Iran, 2012. Arch Trauma Res. 2015;4(1):e22203.
19. Abu-Zidan FM, Abbas AK, Hefny AF, Eid HO, Grivna M. Effects of seat belt usage on injury pattern and outcome of vehicle occupants after road traffic collisions: prospective study. World J Surg. 2012;36(2):255–9.
20. Finfer SR, Cohen J. Severe traumatic brain injury. Resuscitation. 2001;48(1):77-90.
21. Wisch M, Lerner M, Vukovic E, Hynd D, Fiorentino A, Fornells A. Injury patterns of older car occupants, older pedestrians or cyclists in road traffic crashes with passenger cars inEurope – results from seniors. IRCOBI Conf. 2017;17(5):63-78.

AUTHORSHIP AND CONTRIBUTION DECLARATION

AUTHORS	Contribution to The Paper	Signatures
Dr. Mushtaq Ahmed Associate Professor of Forensic Medicine Nishtar Medical University, Multan	Study Designing Collection / Processing of Data Preparation of Results	
Dr. Talha Naeem Assistant Professor of Forensic Medicine Quaid e Azam Medical College, Bahawalpur	Main Author, Manuscript designing, Tabulation of Results, Discussion writing	
Dr. Ummara Munir Assistant Professor of Forensic Medicine Sheikh Zayed Medical College, Rahim Yar Khan	Co-Author, Designing of charts / tables Statistical Analysis, Comparison & Discussion	
Ahmad Raza Khurram Demonstrator of Forensic Medicine Quaid e Azam Medical College, Bahawalpur	Data Analysis, Reference writing, Proof Reading	
Dr. Altaf Pervez Qasim Professor/Head of Forensic Medicine Department Faisalabad Medical University, Faisalabad	Review of Literature, Manuscript writing, Authentication of references, Proof reading	
Dr. Hira Anjum Senior Demonstrator of Forensic Medicine Quaid e Azam Medical College, Bahawalpur	Comparison of results with other studies, Review of literature, Proof reading