Profile of Road Traffic Accident Injuries in a Tertiary Care Teaching Hospital – An Institution Based Cross Sectional Observational Study in Velammal Medical College Hospital and Research Institute, Tamil Nadu

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ABSTRACT

BACKGROUND

Road traffic accidents (RTA) account for most of the injury patients encountered in the department of emergency resulting in significant death and morbidity. The current research was conducted to analyse the demographic, clinical and radiological profile of patients presenting with RTA to a tertiary care teaching hospital (Velammal Medical College Hospital and Research Institute).

METHODS

This cross-sectional observational study was done among 68 subjects presenting with RTA to the department of emergency medicine. Detailed history taking, clinical & radiological investigations including plain radiographs, ultrasound and computed tomography (CT) were done. Site of injury was considered as primary outcome of the study. The data was analysed statistically by deriving mean and standard deviation. International Business Machines Statistical Package for the Social Sciences (IBM SPSS) version 22 was used for statistical analysis.

RESULTS

Among the study population, the mean age was 36.18 ± 13.73 years. 83.82 % were males. Individuals aged less than 40 years of age were greatly involved in RTA. Majority (77.9 %) had abdominal injuries followed by 36.7 % with craniofacial trauma, 25 % had thoracic trauma, 17.6 % had spinal trauma, and 10.2 % had extremity and pelvic bone injuries. In abdominal trauma, spleen (26.4 %) was the commonly affected organ. Liver (25 %) and renal injuries (16.17 %) were next commonly observed. A significant difference (P-value < 0.05) was found in abdominal injuries due to different types of vehicles.

CONCLUSIONS

RTIs are common in the younger population. The predominance of the male population was seen. The most common organ to be injured was spleen. Proper understanding of the pattern of trauma may help in improving the outcome. Early diagnosis, aggressive resuscitation and timely surgical intervention were essential in improving the outcome in trauma patients.

KEYWORDS

Road Traffic Accidents, Road Traffic Injuries, Head Injury, Blunt Abdominal Trauma, CT Scan

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BACKGROUND

Road traffic accidents (RTA) are multifactorial with multidimensional issues caused by a combination of factors involving the person driving and the environment comprising of the road & the vehicles leading to road traffic injuries (RTI).[1] The environmental predisposing factors like rainy and foggy climate increases the risk of RTA.[2] In weekend days and holidays, there is an increased incidence of road traffic accidents.[3] Head is the most vulnerable part to get fatally injured in RTA. Young males are at increased risk of head injury in RTA riding two-wheelers.[4] Blunt abdominal trauma (BAT) is also associated with significant morbidity and mortality in RTA and Other injuries such as bony injuries may require immobilisation and contribute to significant morbidity. Nearly 75 % of BAT are resulted due to motor vehicle, falls, accidents or road / pedestrian accidents.[5,6] Unrecognised intraabdominal injury remains a distressingly frequent cause for preventable death in a patient with blunt injury abdomen.[7] It requires a high level of suspicion, urgent evaluation and time management to decrease morbidity and mortality.[8]

Abdomen is a very vulnerable site with many vital organs, and abdominal injuries are often life-threatening.[9] Assessment of polytrauma patients poses a significant diagnostic challenge to emergency physicians. The term "polytrauma" has been frequently defined in terms of a high injury severity score (ISS) and has been generally used interchangeably with terms such as "severely injured" or "multiple trauma.[10] The internationally accepted threshold of an ISS ≥ 16 is based on the description as being predictive of a mortality risk above 10 %.[11]

The haemodynamic status of the patient should be considered while using diagnostic tests. The subjects are considered to be unstable, if the blood pressure drops to less than 90 mm Hg, heart rate greater than 120 beats per min with clinical signs of peripheral vasoconstriction which causes coldness, altered awareness and reduced breathing capacity. In such cases, primary diagnostic aids such as radiographs and ultrasonography are suggested.

In cases of haemodynamically stable patients or in haemodynamically restored patients, CT-scan of full body (a gold standard) should be considered as it inspects full body. A study done by Jayant V et al. showed a sensitivity of 97.3 % and specificity 75 % with positive predictive value for CT scan.[12] Ultrasound scan and radiographs were used in preliminary diagnosis when the patient was in serious condition. In such situations, radiologist plays an important role in providing initial diagnostic validation of life-threatening state. Diagnostic test such as radiographs of chest and pelvis in anteroposterior, cervical spine radiograph with a lateral view, extended focused assessment with sonography for trauma scan (E-FAST) requires patient to be stabilised in supine position with the help of maneuvers and resuscitators at bedside.

However, a full body CT scan is the gold standard for evaluating injured person. The present study was conducted to assess demographic and clinical profile (injured organs) of road traffic accident victims.

METHODS

This cross-sectional observational study was done on 68 subjects presenting with RTA and immediate care to the Department of Emergency Medicine of a tertiary hospital from January 2018 to January 2019. Only cases coming to the Department of Emergency Medicine were included as subjects presenting with minor ailments were treated as outpatient itself. All subjects who presented with RTA during the study period, irrespective of their age were included in the study. The sampling was purposive. All the subjects in the sampling frame were included. Subjects who have been admitted for reasons other than RTA and other cause of injury such as gun shots, penetrating, stab and paediatric population were excluded from the study.

Ethical approval for the study was obtained from the institutional ethical committee. After admission, a detailed history was taken from the patient or the relatives accompanying them. Detailed clinical examination followed by relevant investigations were done. Detailed radiological investigations were done which included plain radiographs, ultrasound and CT. (Figures 1, 2, 3). The site of injury including head injury, spinal trauma, thoracic & abdominal trauma, pelvis and extremity trauma were the primary outcome variables. The descriptive data was analysed by standard deviation and mean values and quantitative data was analysed by proportion and frequency. International Business Machines Statistical Package for the Social Sciences (IBM SPSS) version 22 was used for statistical analysis.[13]

Figure 1. Horseshoe Kidney with Grade 4 Renal Injury

Figure 2. Grade 3 Splenic Injury

Figure 3. Grade 4 Liver Injury

RESULTS

A total of 68 subjects were included in the final analysis.

Parameter	Summary
Age (Mean ± SD) in Years	36.18 ± 13.73
Gender	(No and %)
Male	57 (83.82 %)
Female	11 (16.18 %)

Table 1. Descriptive Analysis of Demographic Variables in the Study Population (N = 68)

Among the study population, the mean age was 36.18 ± 13.73 years. The majority of the study population (83.82 %) were males and 16.18 % were females. (Table 1)

Road Traffic Injuries	Number (%)
Abdominal injury	53 (77.9 %)
Craniofacial trauma	25 (36.7 %)
Thoracic trauma	17 (25.0 %)
Spinal trauma	12 (17.6 %)
Extremity and pelvic bone injuries	7 (10.2 %)

Table 2. Descriptive Analysis of Road Traffic Injuries in the Study Population (N = 68)

The abdominal injury was the most common in our study, followed by craniofacial trauma, thoracic trauma, spinal & extremity trauma and pelvic bone injuries. (Table 2)

Injured Abdominal Organ / Structure	Number (%)
Spleen	18 (26.4 %)
Liver	17 (25 %)
Kidney	11 (16.17 %)
Mesentery	2 (2.94 %)
Adrenals	2 (2.94 %)
Pancreas	2 (2.94 %)
Anal sphincter complex injury	1 (1.47 %)

Table 3. Descriptive Analysis of the Spectrum of Abdominal Injury in the Study Population (N = 68)

Among the patients with an abdominal injury, the spleen was the most frequently injured organ, followed by liver and renal injuries. Injuries in the pancreas, adrenal and mesentery were less common. A case also had an anal sphincter complex injury. (Table 3)

Road Traffic Injuries	Pedestrian (N = 10)	2-Wheeler (N = 37)	4-Wheeler Light Weight Vehicles (N = 16)	4-Wheeler Heavy Weight Vehicles (N = 5)	P-Value
Abdominal injury	3 (30 %)	32 (86.49 %)	15 (93.75 %)	3 (60 %)	< 0.001
Craniofacial trauma	2 (20 %)	11 (29.73 %)	9 (56.25 %)	3 (60 %)	0.123
Thoracic trauma	2 (20 %)	8 (21.62 %)	5 (31.25 %)	2 (40 %)	0.731
Spinal trauma	1 (10 %)	7 (18.92 %)	3 (18.75 %)	1 (20 %)	0.924
Extremity and pelvic bone injuries	1 (10 %)	3 (8.11 %)	2 (12.5 %)	1 (20 %)	0.853

Table 4. Comparison of Type of Vehicle with Road Traffic Injuries

The abdominal injury was most significant in light weight vehicle accidents compared to other type of vehicles. The difference in abdominal injuries due to different types of vehicles was found to be significant with a P-value of < 0.05. Although there was no significant difference among the type of injury occurred due to different mode of transportation, heavy weight vehicle accidents were found to cause the most types of injuries compared to other mode of transportation. The difference in type of road traffic injuries due to different types of vehicles was found to be insignificant with a P-value of > 0.05, with majority of participates injured by light weight vehicles.

Injured Abdominal Organ / Structure		Pedestrian (N = 10	2-Wheeler (N = 37)	4-Wheeler Light Weight Vehicles (N = 16)	4-Wheeler Heavy Weight Vehicles (N = 5)	P-Value
Spleen	Yes	2 (20 %)	8 (21.62 %)	6 (37.5 %)	2 (40 %)	0.545
	No	8 (80 %)	29 (78.38 %)	10 (62.5 %)	3 (60 %)	
Liver	Yes	2 (20 %)	9 (24.32 %)	4 (25 %)	2 (40 %)	0.863
	No	8 (80 %)	28 (75.68 %)	12 (75 %)	3 (60 %)	
Kidney	Yes	3 (30 %)	6 (16.22 %)	1 (6.25 %)	1 (20 %)	0.453
	No	7 (70 %)	31 (83.78 %)	15 (93.75 %)	4 (80 %)	

Table 5. Comparison of Type of Vehicle with Injured Abdominal Organ / Structure

The difference in injured abdominal organ / structure due to different types of vehicles was found to be insignificant with a P-value of > 0.05, with majority of participants injured by light weight vehicles. In our study we found no death among the study population.

DISCUSSION

Trauma is the major and one of the topmost aetiology for mortality and disability in low-middle-income countries. Among the population aged 45 of age, trauma has been the leading cause of demise, with 5th most common cause of mortality in overall population. Blunt trauma, also called wide impact trauma is the most common type of injury which occurs as a result of vehicle accidents. Other causes for injury were related to work and home related accidents which resulted as crush, blast injuries and fall from a reasonable height. With an increase number of mechanical vehicles and poor implementation of traffic safety regulations, there is a rapid increase in the incidence of road traffic accidents and associated RTI. Multisystem trauma is a characteristic of motor vehicle accidents. Nearly 75 % of injury in RTA are blunt abdominal injury.[6] Similarly, in our study, we found abdominal injury in majority which was in comparison to Mohapatra et al. and by Curie et al. studies.[14,15]

However, in our study we found light weight vehicle accidents leading to abdominal injury in majority of them, whereas the mentioned studies showed fall from height as the leading cause for abdominal injury. Certain cases of injury may require immediate surgery. Abdominal injuries require surgery in about 25 % of cases. The current study revealed more males were affected than females. In a study by Adejumo AA et al. 75.3 % of males were affected.[16] Another study presented male to female ratio (M: F) of 3.7:1.[17] Similarly, 75 % patients were males in a study by Shahzad M et al.[18] Current results and the previous literature showed that males were more prone for RTI than females as a consequence of risky driving behaviour and violation of traffic rules more commonly seen in males. In the present study, the majority (77.9 %) of the injuries were abdominal

injuries. It has been determined that 20 % of traumas due to road accidents occurred in the abdomen.[19]

In the study by Yangala R et al.[20] it was found that 60 % of the participants had RTA as a cause of abdominal injury. Saini S et al.[21] and Bhandari V et al.[22] in their research concluded that road traffic accident was the most common cause of injury and abdominal traumas were blunt.[23,24] young people were affected more as they are the people who move from one place to the other for their family needs.[25] Similarly, in the present study, majority of the population were young adults with the mean age of 36.18 ± 13.73 years. Kumar A et al. in their study had also reported that the highest number of deaths were in the 21 - 30 years age group, 37 (24.7 %) out of 150 cases.[26] The higher incidence of abdominal trauma in this age group reflects more active and outdoor life of the young people. Majority of abdominal injuries (30.3 %) were as a result of RTAs in the study by Adejumo A.A. et al.[16] This can be due to poor road infrastructure, rash and careless driving habits specially by young generation and non-compliance of motorists with standard safety measures.

In the present study, spleen (26.4 %), liver (25 %) and kidneys (16.17 %) were the majorly affected abdominal organs. In the study by Adejumo AA et al. the spleen was the most common organ injured as an isolated injury as seen in 29.8 % of participants.[16] In another study, spleen was the most common organ injured in 42.1 % of patients and liver in 31.57 % of patients.[27] Although, we found no statistically significant spleen involvement across the type of motor vehicle accidents, we found spleen involvement common in all vehicles causing RTA. (Table 5)

The status and co-existing injuries which may distract the attending surgeon from properly assessing difficulties in diagnosis arises from the factors like delay in reaching the hospital, altered mental status of the patient and co-existing injuries.[28]

CONCLUSIONS

The present study results conclude that RTI is more common in the younger population. Males were more commonly involved. Abdominal injury was the most common type of injury among all the vehicles but significant in four-wheeler light vehicle accidents. Spleen was the most common internal organ involved in RTA. Road traffic injuries lead to multisystem trauma. The extent of trauma caused by RTA should always be assessed by using appropriate diagnostic imaging tools such as ultrasound scan, x-ray or full body scan followed by required blood investigations. However, before these investigations, it is very vital that subjects are haemodynamically stable with immediate life support. Further, in stable subjects, non-surgical and a conservative approach is suitable to reduce complications. However, in cases of abdominothoracic injuries, head injuries and fractures, the prognosis is not good. Hence, proper understanding of the pattern of trauma may help in improving the outcome. Early diagnosis, aggressive resuscitation and timely surgical intervention are essential in improving the outcome in trauma patients.

Limitations

Small sample size is a limitation of this study. This is a single study centre. Although, few patients had recorded the grade of organ injury, few didn't. We strongly recommend that similar multi-centric studies should be conducted with a larger sample size.

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