A Comparative Data Analysis of 1835 Road Traffic Accident Victims

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Abstract

Aims and Objectives: The purpose of the study was to analyze and compare the incidence of road traffic accidents (RTA) with head injuries and maxillofacial injuries in two arterial roads, Old Mahabalipuram road (OMR) and East Coast road (ECR), connecting with Chennai city and outlining the need of safety precautions to be followed to reduce the incidence of morbidity. **Materials and Methods:** This study involved the medical records of about 1835 trauma victims who reported to Chettinad Health city, kelambakkam, between August 2008 and June 2013. The data analyzed were, age of trauma victims, gender, type of trauma, type of vehicle, accident time, accident zone, presence of head injury, maxillofacial injury and history of alcohol consumption. **Results:** Trauma victims were predominantly male (84.3%), with majority of individuals in the age group of 21-40 yrs (56%). About 42% of the reported accidents occurred in OMR and 18.3% of accidents occurred in ECR. About 51.2% of the reported road traffic accidents occurred in the busy traffic hours, between 7am-10am and 5pm-9pm. About 66.4% of RTAs were due to two wheeler vehicles and 21.6% were due to four wheeler vehicles. The incidence of head injury was 47.5% and about 1417 (77.2%) patients reported with maxillofacial injuries. **Conclusion:** RTAs are more common in OMR than in ECR, involving mostly male victims and two wheeler vehicles, during the peak traffic hours. Rash driving and over speeding of vehicles are the preventable causative factors.Wearing of Helmets by the two wheeler riders and seat belts by the four wheeler riders are essential to prevent morbidity. We stress the need of separate lane for Ambulance on the roads for faster transport of accident victims to nearby Hospital and trauma care centers.

Keywords: East Coast Road, head injury, Old Mahabalipuram Road, road traffic accident

Introduction

In India, approximately 28% of the total disability-adjusted life years lost due to injuries are attributed to road traffic injuries (RTIs) alone. In 2016, there were 150,785 deaths occurring in 480,652 road crashes. Further, RTI-related deaths have increased by 43% over the last 10 years. Unless new initiatives and intense efforts are made, the total number of road traffic deaths in India is likely to surpass 250,000 by 2025.[1] The more progressive and developed states such as Andhra Pradesh, Maharashtra, and Tamil Nadu are the most affected by road traffic accidents (RTAs). According to State Crime Record Bureau of Chennai, the total number of RTAs reported in the state of Tamil Nadu in the year 2016 is about 71,000 accidents, involving nearly 1 lakh individuals, highest in India; among these, about 17,000 are fatal. Chennai city accounts for highest incidence of RTAs than any other city in India.[2] The East Coast Road (ECR) from Pondicherry and the Old Mahabalipuram Road (OMR) from Mamallapuram leading to Chennai city suffer from heavy traffic and high incidence of RTAs. Early mobilization of patients from the accident site to the trauma care centers plays a crucial role in survival of the accident victims. The aims and objective of the study were to compare the incidence of RTAs between OMR and ECR and the occurrence of head injury and maxillofacial injuries among those patients and to stress the need of safety precautions

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and early mobilization of victims to trauma care center from accident site to reduce morbidity.

Materials and Methods

This study involved the records of about 1835 trauma victims who reported to Chettinad Health City, Kelambakkam, between August 2008 to June 2013. The data were analyzed retrospectively from the inpatient medical records available at the hospital. The data collected were age, gender, type of trauma, type of vehicle, accident time, accident zone, presence of head injury, maxillofacial injury, and alcohol consumption. Comparative data analysis was done between accident time and head injury, accident zone and type of vehicle, accident zone and head injury, accident zone and type of injuries such as soft-tissue and maxillofacial bone injuries, comparison of age of victim and maxillofacial injury, and comparison of age and alcohol consumption.

Results

A total of 1835 trauma victims were studied retrospectively. Majority of individuals were in the age group of 21–40 years (56%). Among the victims, males were predominant (84.3%) than females (15.7%). The accident zones were broadly divided into OMR, ECR, and others. About 42% of accidents occurred in OMR, and ECR accounted for 18.3% of accidents. Majority of reported accidents occurred in the busy hours (51.2%), between 7–10 a.m. and 5–9 p.m [Table 1]. Out of 1835 trauma victims, 1806 (98.4%) were due to RTAs. Two-wheeler accidents accounted for 66.4% of the RTAs and 21.6% were due to four-wheeler accidents.

The incidence of head injury was 47.5% (872 victims), and about 1417 (77.2%) patients reported with maxillofacial injuries. In the present study, on application of Pearson's Chi-square test, there was a statistically significant difference ($P < 0.05$) found in relation of accident time and the incidence of head injury, with Chi-square value of 14.509 [Table 1]. On comparing accident zone and type of vehicle, 1219 accidents occurred due to two-wheelers and 396 accidents occurred due to four-wheelers, and the occurrence was high in OMR compared to ECR [Table 2], $\chi^2 = 39.78$, $P = 0.01$ ($P < 0.05$ – statistically significant). On comparing accident zone and occurrence of head injury, 414 cases reported from OMR and 164 cases from ECR with $\chi^2 = 25.69$, $P = 0.01$ ($P < 0.05$ – statistically significant [Table 3]. On comparing accident zone and soft tissue injury, it was found that majority of patients had soft-tissue injury of both extremities and facial region and the occurrence was more common in OMR compared to ECR with $\chi^2 = 17.74$, $P = 0.007$ ($P < 0.05$ – statistically significant) [Table 4]. Incidence of maxillofacial injuries was more common in OMR compared to ECR ($P < 0.05$) [Table 5]. In the study group, occurrence of maxillofacial injuries was more common among the age group of 21–40 years, 766 patients out of 1417 patients who reported with facial bone injuries, with $\chi^2 = 16.80$, $P = 0.001$ ($P < 0.05$) [Table 6].

Table 1: Comparison of accident time with head injuries

Crosstab

Count

Accident time	Head injury		Total
	No	Yes	
Unknown	129	70	199
Leisure	346	351	697
Busy hours	488	451	939
Total	963	872	1835

χ^2=14.509; df=2; P=0.01 (P<0.05 - statistically significant)

Table 2: Comparison of accident zone and type of vehicle

Crosstab

Count

Accident zone	Type of vehicle			Total
	Two-wheeler	Four-wheeler	Others	
Others	466	137	123	726
OMR	547	162	65	774
ECR	206	97	32	335
Total	1219	396	220	1835

χ^2=39.78; df=4; P=0.01 (P<0.05 - statistically significant). OMR=Old Mahabalipuram Road; ECR=East Coast Road

Table 3: Comparison of accident zone and head injury

Crosstab

Count

Accident zone	Head injury		Total
	No	Yes	
Others	432	294	726
OMR	360	414	774
ECR	171	164	335
Total	963	872	1835

χ^2=25.69; df=2; P=0.01 (P<0.05 - Statistically significant). OMR=Old Mahabalipuram Road; ECR=East Coast Road

Table 4: Comparison of accident zone and soft tissue injury

Crosstab

Count

Accident zone	Soft-tissue injury				Total
	n	Facial lacerations	Extremity laceration	Both	
Others	171	10	37	508	726
OMR	137	7	29	601	774
ECR	74	1	7	253	335
Total	382	18	73	1362	1835

χ^2=17.74; df=6; P=0.007 (P<0.05 - statistically significant). OMR=Old Mahabalipuram Road; ECR=East Coast Road

We had compared the age group of victims and the history of alcohol consumption before accidents. Interestingly, about

Table 5: Comparison of accident zone and maxillofacial injury

Crosstab			
Count			
Accident zone	Maxillofacial injury		Total
	No	Yes	
Others	590	136	726
OMR	567	207	774
ECR	260	75	335
Total	1417	418	1835

χ^2=13.70; df=2; *P*=0.001(*P*<0.05 - statistically significant). OMR=Old Mahabalipuram Road; ECR=East Coast Road

Table 6: Comparison of age of the victim and maxillofacial injury

Age (years)	Maxillofacial injury		Total
	Yes	No	
<20	255	79	334
21–40	766	262	1028
41–60	329	68	397
>60	67	9	76
Total	1417	418	1835

χ^2=16.80; df=3; *P*=0.001 (*P*<0.05 - statistically significant)

Table 7: Comparison of age and alcohol consumption

Age (years)	Alcoholism		Total
	No	Yes	
<20	321	13	334
21–40	855	173	1028
4–60	358	39	397
>60	74	2	76
Total	1608	227	1835

χ^2=15.02; df = 3; *P*=0.00 (*P*<0.05 - statistically significant)

1608 victims who met with the accident did not consume any form of alcohol before trauma, a statistically significant data with $P < 0.05$. Among the individuals who met with accident after consuming alcohol, patients in the age group between 21 and 40 years are high compared to other age groups [Table 7].

Discussion

ECR is a scenic state highway from Chennai to Cuddalore via Pondicherry along the coast of the Bay of Bengal. It is a two-lane stretch, extending up to Kanyakumari. It is a host for various places of tourist attraction and beach house resorts. OMR, or Rajiv Gandhi Salai, starts from Madhya Kailash Temple up to Poonjeri, a village close to Mahabalipuram, which is a road of IT hub, hosting TIDEL park, SIPCOT, and various IT companies and witnessing heavy traffic till Siruseri on weekdays. These two arterial roads connecting with Chennai city experience heavy traffic congestion, overspeeding of vehicles, and high incidence of RTAs during peak hours. The "Global Report on Urban Health" released by the UN-Habitat and WHO says that the number of persons killed per lakh population due to RTAs in Chennai was the second highest across the major selected cities, at 26.6%. Motorcycle accidents only account for approximately 50% of all traffic-related injuries. The incidence of facial injuries in motorcycle and foot-powered cycling accidents is predictably significant. In developing nations, where wearing helmets is not compulsory, almost 60% of head injuries related to motorcycling accidents.[3]

In the developing world, RTAs account for a majority of maxillofacial trauma;[4-7] the introduction of seat belts and improvements in car design have greatly decreased the incidence of fatalities and RTA-associated maxillofacial trauma.[8] The most important factor in determining the extent of injury which patients sustain in RTAs is the direction of the collision. Drivers involved in head-on collision have an 18% increase in survival.[8] Like seat belts, the airbag has proven to be effective in reducing injury and fatalities in motor vehicle accidents. Airbags work best when combined with a belted driver, reducing fatalities by more than 50%. In an unbelted driver, airbags reduce fatalities by up to one-third and the decrease in facial injuries due to the prevention of direct facial impact onto the steering wheel, dashboard, or seat.[9,10] Despite the incontrovertible evidence, it is alarming to note that a large number of car occupants and motorcyclists involved in RTAs failed to wear either safety belts or crash helmets. These findings may be partially explained by the association of injuries with alcohol and/or drugs. The other factor that significantly affects the severity of injury is the speed at which an accident occurs. Because of the concept of applied force/kinetic energy (K = 1/2 MV2), even small increase in speed results in disproportionate intensification of injury. The converse is inevitably true: small reductions in speed reduce the seriousness of the injuries sustained.[11,12]

Head injuries are common in RTAs. Majority of head injuries are mild, 10% are moderate, and 10% are severe.[13] Many head injuries are minor and as such are unreported to medical attendants. Many head injuries are part of the spectrum of serious injuries sustained during polytrauma. No single international disease classification exists for head injuries; instead, patients are classified under categories such as S00 – superficial injury of the head and S02 – fracture of the skull and facial bones; while these diagnoses are suggestive of brain injury, the underlying injury is not described.[14] The Glasgow Coma Scale (GCS) is the scale most widely used to assess consciousness following a head injury.[15] The GCS with image linking of computed tomography scan allows a rapid evaluation of the severity of the injury to be made by the neurosurgeon and a decision made whether transfer to the neurosurgical unit is required. The GCS also has been shown to have prognostic value about the eventual outcome of the injury.[16,17] Neurological injuries are common in patients with faciomaxillary trauma. About 14.6% of blunt trauma is reported to be with facial fractures. Among the patients with

blunt trauma and facial fractures, 79.4% suffered from brain injury.[18] Satisfactory treatment outcomes for injured patients are strongly influenced by the initial care delivered, particularly in the "golden hour" following admission to the hospital emergency department.[19] Death due to trauma has trimodal distribution, with the first peak occurring within seconds to minutes of injury, due to brain, brain stem, spinal cord, heart, or great vessel injury. The second peak occurs within minutes to hours of injury, mainly due to subdural/epidural hematomas, hemothorax/pneumothorax, pelvic fractures, and spleen/liver lacerations. The third peak occurs in days to weeks after the initial injury and mortality at this stage is due to sepsis and multiorgan failure.[20] Inadequate assessment and resuscitation contribute to a preventable death rate of as high as 35%.[21] It has been reported that 80% of those patients who succumbed to their traumatic injuries in the first hour after arrival did so within the first 15 min.[22] A study shows that protection from skull fractures, subdural hematomas, and no extradural hematoma in the helmeted cyclists suggests that helmets have greater benefits in protecting from the effects of direct impact rather than the effects of shearing injuries which tend to result in contusions and Subarachnoid hemorrhage (SAH).[23] The overall risk of death is significantly lower when care is provided in a trauma center than when it is provided in a nontrauma center.[24]

Conclusion

We conclude from our study that the RTAs are more common in OMR than in ECR, most of the accident victims are of the age group 21–40 years, predominantly males, and more than 60% of accidents were involving two-wheelers. Most of the accidents happened during peak traffic hours between 7–10 a.m. and 5–9 p.m. Nearly 50% of trauma victims suffered with head injury and more than 70% of the victims had maxillofacial injuries. These findings confirm that wearing helmets by the two-wheeler riders and wearing seat belt by four-wheeler riders are very essential in preventing injury and reducing the casualty during a RTA. Overspeeding of vehicles is one very important preventable etiological factor in RTAs. According to the law, motorists are required to make way for an emergency vehicle on hearing the siren. However, that rarely happens because of the traffic chaos that reigns in the city. We stress the need for a dedicated lane for ambulance and other emergency vehicles in Chennai city and suburban area, since every hour and minute is very critical in an emergency situation.

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Conflicts of interest

There are no conflicts of interest.

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