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AN OBSERVATIONAL RETROSPECTIVE ANALYSIS ON PATTERN, SEVERITY AND CIRCUMSTANCES OF INJURIES IN VICTIMS OF ROAD TRAFFIC ACCIDENTS IN A TERTIARY CARE HOSPITAL, TAMILNADU

Community Medicine

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ABSTRACT

Road Traffic Accident (RTA) is a severely rising problem in the growth of the transport system due to industrialization and urbanization in India. This study attempted to ascertain the pattern and severity of injuries sustained by victims of road traffic accidents and to establish the association between severity of injuries with various factors responsible for road traffic accidents. This hospital based retrospective analysis included 1228 victims of Road Traffic accident reporting to emergency department of a Tertiary care hospital using medicolegal records for data collection. Factors such as age below 30years, male gender, accidents occurring on National highways and two-wheeler accidents were found to have statistically significant ($p<0.05$) association with severity of injuries in various sites of body using chi-square test. Regulating speed, wearing seat belts and helmets, good lighting on roads and increasing traffic patrols at night time by prescribed and firm traffic rules is vital.

KEYWORDS

two-wheeler, pattern of injury, severity of injury, National Highways, Retrospective analysis

INTRODUCTION

Road Traffic Accident (RTA) is a severely rising problem in the growth of the transport system as there is massive increase in the number of vehicles due to industrialization and urbanization in developing countries, like India [1]. For the reason that, World Health Organization's (WHO) World Health Day for 2004 was dedicated to road safety [2]. Formerly, road traffic injuries were the leading cause of permanent disability and mortality among those in productive age in developed countries but currently the developing countries are also facing a similar challenge as they undergo which has been termed as "epidemiology of transition" [3]. Among the children, vaccine preventable diseases are major concern and also among the middle aged and elderly patients, non-communicable diseases are prevalent whereas in the young population of 15–44 years, RTA's have become leading killer disease.[4]

In terms of pattern of RTAs, motorcycles related trauma is and remains a major cause of morbidity and mortality in those of productive age in developing world [5]. According to Ministry of Road Transport and Highways 2017 report, more than 70% of road crashes involved adults in the age group of 18-45 years, also 4.64 lakhs accidents reported in the same year. In terms of road categories involved, the National Highways (NH) accounted for 30.4 per cent of total road accidents in the same year.[6]

Many studies in India expresses severity and pattern of injuries sustained during RTAs [5,6,7] but only few studies describe about roadways and vehicles involved in RTAs, which is the utmost cause for sustaining accidents [8]. Therefore, with this background, this study attempted to ascertain the pattern and severity of injuries sustained by victims of road traffic accidents and to establish the association between severity of injuries with various factors responsible for road traffic accidents.

METHODOLOGY

This is a hospital based retrospective cross-sectional study, which was conducted in a Tertiary level health care hospital in South India. This is a medical training and research institute located in the capital city of Tamilnadu. This hospital is situated on Chennai – Bangalore National Highway (NH). Indian roads have been divided into three systems, major cities have been connected by National Highways, districts have been connected by State Highways and small towns being connected by district and village roads [7]. Our institution serves as one of the best emergency care providers to road traffic accident victims, as it has well-furnished emergency department with speedy ambulatory facilities and also it is positioned on express highway, where vehicles are driven with boundless speed. RTA was defined as "accidents of one or more vehicle(s), one of which must be moving in any kind and occurring on the road (i.e. originating on, terminating on) and resulting in injury" [9].

This study included all the RTA victims reporting to the Emergency Department from July 2018 to December 2018. Deaths due to RTAs were excluded from the study. This study has been conducted after obtaining ethical clearance from the institutional ethical board. A total of 1228 RTA victims were included. For the purpose of data collection, the medico legal records and case sheets of these victims from the Medical Records Department of the institution were obtained to fill the structured proforma. The proforma included socio demographic variables, type of vehicle involved, type of road used, time of RTA, type of injury, anatomical body parts involved. The severity of the injury was graded using 'New Injury Severity Score' [10]. Based on this scale, score less than or equal to 24 and more than 24 were classified as simple and grievous for the purpose of study.

Data obtained were entered in the Microsoft excel office 365. The statistical analysis was done using SPSS 21.0 version software. Frequencies and percentages were used to describe the data. Chi-square test was used to find association of independent variables with severity of injuries and multivariate analysis using logistic regression was used to get the adjusted values for the same. The results were considered statistically significant if the p value is <0.05

RESULTS

This study comprises a total of 1228 cases, out of which 524(42.7%) victims belong to the age group of 21 –30 years, while 480(39%) subjects are above 30 years age and the remaining meagre portion of them 124(18.3%) belong to less than 20 years of age. Most of the victims 958(78%) were males and the rest 270(22%) were females. More than half of the accidents i.e. 748(60.9%) occurred on National highways and also majority (39%) of them took place during 6pm to 12am, followed by 12pm to 6pm (29%).

Two-wheeler skid and fall accounts for single major cause of RTAs (more than half) and other two-wheeler accidents accounts nearly one-third (Figure 1). The commonest anatomical site involved in injury is lower limb, followed by upper limbs, head & neck and Maxillofacial regions. Grievous head injuries were reported at maximum in the current study. In respect of pattern of injuries, even though abrasions and bruises are maximum, a considerable amount 442(22.3%) of lacerations and 153 fractures have been reported (Table 1).

Figure 1: Vehicles and Type of Collisions

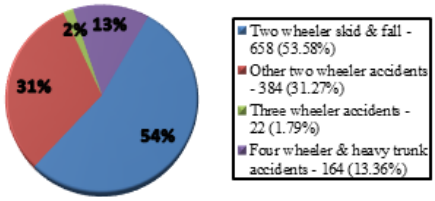

Table 1: Anatomical parts involved and pattern of injuries sustained

Sites and pattern of injury	Abrasions N (%)	Bruises N (%)	Fractures N (%)	Lacerations N (%)	Multiple injuries N (%)
Lower limb injuries	381(60)	118(18.61)	57(8.99)	70(11.04)	8(1.26)
Upper limb injuries	324(58.48)	110(19.86)	48(8.66)	62(11.19)	10(1.8)
Maxillofacial injuries	70(25.18)	54(19.42)	22(7.92)	128(46)	4(1.44)
Head & Neck injuries	102(26)	94(23.98)	20(5.1)	174(44.39)	2(0.5)
Chest injuries	24(48)	20(40)	2(4)	4(8)	-
Abdomen injuries	20(58.82)	10(29.41)	-	4(11.76)	-
Back injuries	10(31.25)	18(56.25)	4(12.5)	-	-
Total injuries	931(47.81)	424(21.48)	153(7.75)	442(22.39)	24(1.22)

Many factors such as age below 30years, male gender, accidents occurring on National highways and two-wheeler accidents were found to have statistically significant ($p<0.05$) association with severity of injuries in various sites of body using chi-square test. The Odd's ratio and 95% Confidence Interval is also mentioned. (Table 2)

Table 2: Association between independent predictor factors of RTA and severity of Injuries

Predictors		Severity of Injury		Upper limb Injuries		Lower limb Injuries		Head & Neck		Trunk Injuries	
		Simple	Grievous	Simple	Grievous	Simple	Grievous	Simple	Grievous	Simple	Grievous
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Age (Years)	< 40	486 (65)	262 (35)	680 (90.9)	68 (9.1)	663 (88.6)	85 (11.4)	572 (76.5)	176 (23.5)	742 (99.2)	6 (0.8)
	> 40	263 (54.8)	217 (45.3)	428 (89.2)	52 (10.8)	430 (89.6)	50 (10.4)	348 (72.5)	132 (27.5)	474 (98.8)	6 (1.3)
	OR(CI)	1.53(1.21,1.93)		1.125(0.86,1.77)		1.10(0.76,1.59)		1.233(0.94,1.63)		1.56(0.5,4.89)	
	p	0.0000*		0.316		0.605		0.11		0.436	
Gender	Male	568 (59.3)	390 (40.7)	862 (90)	96 (10)	837 (87.4)	121 (12.6)	720 (75.2)	238 (24.8)	948 (99)	10 (1)
	Female	181 (67)	89 (33)	246 (91.1)	24 (8.9)	256 (94.8)	14 (5.2)	200 (74.1)	70 (25.9)	268 (99.3)	2 (0.7)
	OR (CI)	1.39(1.05,1.85)		1.142 (0.74,1.80)		2.643 (1.49,4.66)		0.944(0.69,1.44)		1.414(0.38,6.49)	
	p	0.021*		0.58		0.001*		0.717		0.65	
Types of Roads	NH road	488 (65.2)	260 (34.8)	674 (90.1)	74 (9.9)	677 (90.5)	71 (9.5)	588 (78.6)	160 (21.4)	742 (99.2)	6 (0.8)
	Other	261 (54.4)	219 (45.6)	434 (90.4)	46 (9.6)	416 (86.7)	64 (13.3)	332 (69.2)	148 (30.8)	474 (98.8)	6 (1.3)
	OR (CI)	1.575(1.25,1.98)		0.965(0.65,1.42)		1.46(1.02,2.101)		1.638(1.27,2.17)		1.53(0.50,4.85)	
	p	0.0000*		0.858		0.036*		0.0000*		0.436	
Time of RTA	Day time	255 (65.4)	135 (34.6)	356 (91.3)	34 (8.7)	355 (91)	35 (9)	31 2(80)	78 (20)	384 (98.5)	6 (1.5)
	Night time	494 (58.9)	344 (41.1)	752 (89.7)	86 (10.3)	738 (88.1)	100 (11.9)	608 (72.6)	230 (27.4)	832 (99.3)	6 (0.7)
	OR(CI)	1.315(1.02,1.69)		1.19(0.78,1.82)		1.372(0.96,2.09)		1.513(1.14,2.08)		0.46(0.19,1.76)	
	p	0.031*		0.396		0.123		0.005*		0.173	
Type of Collisions	Two-heeler	603 (57.9)	439 (42.1)	932 (89.4)	110 (10.6)	919 (88.2)	123 (11.8)	764 (73.3)	278 (26.7)	1032 (99)	10 (1)
	others	146 (78.5)	40 (21.5)	176 (94.6)	10 (5.4)	174 (93.5)	12 (6.5)	156 (83.9)	30 (16.1)	184 (98.9)	2 (1.1)
	OR(CI)	2.65(1.83,3.85)		2.07(1.06,4.04)		1.94(1.05,3.58)		1.89(1.25,2.86)		0.89(0.19, 4.12)	
	p	0.0000*		0.028*		0.032*		0.002*		0.883	

*p value <0.05 is significant using Chi square test

Table 3 shows Multivariate analysis using logistic regression of predictors with grievous injuries. Adjusted odd's ratios with confidence interval is given. Two-wheeler accidents, night time RTAs and NH accidents were significantly associated with serious injuries.

Table 3: Multivariate analysis of independent predictor factors of RTA with Grievous injuries.

	Grievous Injuries		Upper limb Injuries		Lower limb Injuries		Head & Neck Injuries	
	Adjusted OR (CI)	p value	Adjusted OR (CI)	p value	Adjusted OR (CI)	p value	Adjusted OR (CI)	p value
Age (<40)	1.44(1.13,1.83)	0.003*	1.77(0.79,1.73)	0.409	0.89(0.61,1.31)	0.582	1.13(0.86,1.48)	0.350
Males	1.26(0.94,1.70)	0.119	1.06(0.65,1.71)	0.804	2.38(1.33,4.26)	0.003*	0.842(0.61,1.16)	0.295
NH road	1.47(1.15,1.86)	0.002*	0.92(0.62,1.36)	0.676	1.41(0.98,2.03)	0.062	1.60(1.22,2.08)	0.001*
Night time	1.31(1.01,1.69)	0.035*	1.18(0.78,1.80)	0.428	1.32(0.88,1.99)	0.173	1.52(1.13,2.04)	0.005*
Two-wheeler	0.43(0.29,0.64)	0.000*	0.50(0.25,0.98)	0.046*	0.62(0.33,1.16)	0.139	0.55(0.36,0.85)	0.007*

*p value <0.05 is significant

DISCUSSION

In this study, males were the major (78%) victims of RTA because majority of the vehicles were driven by them. This type of male preponderance is shown is many studies on RTA in India [11] Highest number of RTAs are recorded in the 21-30 age group (42.67%). Similarly, about 71% of the victims were under 40 years of age according to a study conducted in Pondicherry [11]. The reason could be due to that the people of the most dynamic and prolific age group are involved in RTAs causing grave economic loss to the family, ultimately affects nation's economy. Also, there is a smaller amount of mishaps in below 10 years age group and above 60 years. This could be due to that the children and older people are often less mobile. [12]. In our study, most (60.9%) of the RTAs occurred on National highways could be due to high speed of vehicles and less traffic signals on them

(Table 2). Whereas, only 24.8% of RTAs befell on National highways in a study conducted by Farooqui JM et.al., in a rural area of western Maharastra.[7] may perhaps be for the reason that the institution where the study was conducted was situated far away from the primary system of road connectivity.

More than half of the victims (53%) met with two-wheeler spin out and fall related accidents, which is a new finding implying the poor and harsh driving of two wheelers and improperly laid roads. However, 59.9% of the victims in a study conducted by Kriti Jaiswal et.al., in rural side of central Uttar Pradesh belongs to motorized two-wheeler related accidents [12]. Similarly, substantial amount of two-wheeler accidents has been reported in other studies conducted in India [13,14,15]. With respect to time of accident, our study is having 838(68.4%) events occurred during night time might be due to deprived illumination.

Conferring to pattern of injuries sustained, in the present study 595(48.4%) of them had grievous injury and also, 24 of the fatalities sustained multiple injuries. Similar results of 48% of victims with severe injury were obtained in a study conducted by Nilambar Jha et.al., in Pondicherry tertiary care hospital [11]. In a study conducted at Tirupathi on risk factors of RTA victims found significant association with not wearing seat belts, under the influence of alcohol and stress with road traffic accidents [8] but this study did not indicate about circumstances like time, place, type of vehicles etc., however, current study evidently states the significant associate with the variables (Table 3).

The findings of the current study will help in observing pattern of injuries, severity of injuries and also association of the risk factors of RTA variables with the severity of injuries but certain hazard factors like alcohol influence, distracted driving, speeding, mobile phone distraction, not wearing helmets could not be assessed as it was a retrospective record based study. A multicentric, long time duration studies are being warranted in developing countries, since the current study was conducted in a single tertiary health care level hospital for 6 months duration.

CONCLUSION

This study concluded that younger and productive age group males are victims of RTAs commonly, who drove motorized two-wheeler vehicles. Lower limb injuries being the most commonly involved anatomical site. Significant association of age less than 40 years, males, accidents on National Highways, driving night time with severity of injuries was observed. Based on these results, accident preventive measures and mass education on road safety with special focus on youngsters is vital. Regulating speed on highways, wearing seat belts and helmets, good lighting on roads and increasing traffic patrols at night time by prescribed and firm traffic rules is the need of the hour.

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