International Journal of Community Medicine and Public Health
Bhat MA et al. Int J Community Med Public Health. 2020 Mar;7(3):958-964
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20200948

Original Research Article

Injury pattern and outcome of road traffic accident victims attending major referral institutions of the Kashmir valley

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Received: 19 December 2019
Revised: 12 February 2020
Accepted: 13 February 2020

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ABSTRACT

Background: Road traffic accidents (RTAs) have emerged as a major global public health problem of this century. WHO global burden of disease study, shows it as the 10th leading cause of death in South-East Asia. In India, according to WHO, road traffic accident is the 6th leading cause of death. The present study aims to assess the magnitude and injury pattern of RTA victims attending three major referral institution of the Kashmir valley.
Methods: This prospective observational study was conducted for a period of one year in three major referral institutions of Kashmir valley. Burden of RTA victims was studied from hospital records. For studying detailed injury patterns, the accident victims fulfilling the inclusion criteria and admitted in the wards of these hospitals formed the main study group.
Results: RTAs constituted 3% of the total admissions. Most (82.7%) of the studied victims were males. Most (40.3%) of the RTA victims were pedestrians. Head on collision was the most common type of accident (62.9%). 97.6% victims were grievously hurt and head (59.9%) was the most affected part of the body. 88.3% of RTA victims survived while 11.7% died.
Conclusions: Young males are the predominant victims of RTAs and head on collision (63%) remains the commonest type of accident. Almost all (97.6%) RTA victims were grievously hurt with 60% having head injuries followed by lower limbs 59.4% and upper limbs 26.8% injuries and 47% victims had multiple injuries.

Keywords: Injury, Kashmir, RTAs

INTRODUCTION

Road traffic accidents (RTAs) have emerged as a major global public health problem of this century and are now recognized as "veritable neglected pandemic".[1] Worldwide, the number of people killed in road traffic crashes each year is estimated at almost 1.2 million, while the number injured could be as high as 50 million.[2] The problem is so severe that, by 2020, it is projected that road traffic disability-adjusted life years (DALYs) lost will move from being the 9th leading cause of disability-adjusted life years lost to the 3rd leading cause in the world and will be 2nd leading cause in developing countries.[1]

Study report released by WHO on the eve of the, "World Day of Remembrance for Road Traffic Victims", showed that road traffic accidents kill 33 people every hour in South-East Asia where the number of road traffic injuries has been rising rapidly. WHO Global Burden of Disease study (2004 update), shows it, as the 10th leading cause of death in the region, responsible for 2% of all mortality. The study also revealed that road traffic injuries were the leading cause of mortality due to injury, accounting for 18% of injury related mortality.[3]

In India, according to WHO, RTA is the 6th leading cause of death with a greater share of hospitalizations, deaths, disabilities and socioeconomic loses in young and middle aged population. Concerned over the increasing trends of road traffic accidents globally and its impact, WHO therefore, for the first time in the history of the organization, dedicated 'World Health Day' 2004 to "Road Safety". Importance of Road Traffic Accidents lies in the fact that the decade 2011-2020 has been dedicated as "Decade of Action for Road Safety". On 2nd March 2010, Governments around the world took the historic decision to increase action to address the road safety crisis over the next 10 years. The UN General Assembly resolution proclaiming a Decade of Action for Road Safety 2011-2020 was tabled by the Govt. of Russian Federation and co-sponsored by more than 90 countries. The decade of action for road safety 2011-2020 aims to save lives by halting the increasing trends in road traffic deaths and injuries worldwide.[4] WHO, in its international conference on RTA, noted the importance of adequate data on traffic injuries. Indeed, accurate estimates of the public health burden of RTA can establish the priority of this public health problem and will provide a rational basis for policy decision. Some nationwide studies have been attempted to get the detailed epidemiology of RTAs in India, and few studies have been published in this regard.

The present study was therefore done with the aim to assess the magnitude of victims of road traffic accidents attending accident and emergency/casualty department of three major referral institutions of Kashmir valley and to study the injury pattern and outcome these victims. This would serve as a basis for measures needed to be taken in order to avert such accidents in future, provide better emergency care to RTA victims and improve outcome of such victims.

METHODS

This prospective observational study was conducted for a period of one year (January 2011 to December 2011) in three major referral institutions of Kashmir valley. These referral hospitals included the Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Soura, Shree Maharaja Hari Singh Hospital (SMHS), Srinagar and Bone and Joint Hospital, Barzulla Srinagar since they bear the major brunt of RTAs in the valley. To assess the load of RTA victims reporting to the accident and emergency/casualty department of above-mentioned referral hospitals information was obtained from respective hospital records. For the detailed study of injury pattern, the accident victims fulfilling the inclusion criteria and admitted in the wards of these hospitals formed the main study group.

Inclusion criteria

Victims falling under the case definition of RTA, i.e. any person suffering injury due to vehicular collision with another vehicle, pedestrian, animal, road debris, or other geographical or architectural obstacle on the road, RTA victims with more than 24 hours stay in the hospital and RTA victims giving consent were included.

Exclusion criteria

Victims of injury on the road without involvement of a vehicle (e.g. a person slipping and falling on the road and sustaining injury) or injury involving a stationary vehicle (e.g., person getting injured while washing or loading a vehicle) have been excluded from the study and RTA victims who did not consent were excluded from the study.

Study variables

For the purpose of the study, detailed information was sought from the victims of RTAs using a predesigned and pretested questionnaire which included questions pertaining to the general demographic variables and the information about the actual details of RTA including type of accident, type of injury, type of vehicle, type of victim, body part injured, number of body parts injured, condition of victim, health care received, conscious level and final outcome. Where the condition of the victims did not warrant the interview, the relatives or attendants were interviewed. Similarly, some factors like reception of first aid at the accident site, source of referral, mode of transportation, number of hospitals visited, type of intervention, duration of intervention and blood transfusion were considered under health seeking behavior factors. These variables were selected for analysis because they are known to be risk factors associated with road accident mortality.

The data thus collected was tabulated and subjected to statistical analysis using bivariate and multivariate analysis.

RESULTS

RTAs constituted 3% (3531) of the total admissions of 115795 in the three major referral institutions of the valley. Out of the 3531 total RTA victims, majority 2444 (69.2%) had reported to SKIMS, 836 (23.7%) to Bone and Joint Hospital and only 251 (7.1%) to SMHS Hospital. RTA victims constituted 5.9%, 5.2% and 0.5% of the total admissions at Bone and Joint hospital, SKIMS and SMHS hospital respectively (Table 1).

Out of the total 3531 RTA victims reporting to various referral institutions, 779 (22.1%) constituted the study group for detailed information on injury pattern as they had a stay of more than 24 hours and consented to be the part of study.

Most of the RTA victims were literate constituting up to 70.5% (549) of the total study group. The literacy status varied from primary to graduation and above. Most of the

victims were students (23.9%) followed by business and service class. Majority of the victims were Muslims by religion and most of them belonged to joint families (Table 2).

Table 1: Road traffic accident victims attending major referral institutions of Kashmir valley.

Institution	No. of total admissions	Total road traffic accident victims		% RTAs
		N	%	
SKIMS	47280	2444	5.2	69.2
SMHS	54335	251	0.5	7.1
Bone and Joint Hospital	14180	836	5.9	23.7
Over all	115795	3531	3	100

Table 2: Distribution of RTA victims by socio-demographic characteristics.

Category		N (%)
Education	Illiterate	206 (26.4)
	Literate	549 (70.5)
	Others	24 (3.1)
Occupation	Labourer	65 (8.3)
	Student	186 (23.9)
	Farmer	54 (6.9)
	Business	108 (13.9)
	Service	133 (17.1)
	Others	233 (29.9)
Family type	Nuclear	275 (35.3)
	Joint	442 (56.7)
	Extended	62 (8.0)
Religion	Islam	759 (97.4)
	Hindu	13 (1.7)
	Sikh	6 (0.8)
	Others	1 (0.1)
Marital status	Married	423 (54.3)
	Single	227 (29.1)
	Not applicable	129 (16.6)

Mean age of victims was 34.1±17.3 (males 33.7±17.0, females 35.9±18.7). Most of the studied victims were males 82.7% (644) and in both the sexes victims mostly were below 50 years of age 81.77% (637). Common age groups involved were 21-30 years constituting 22.3% (174) followed by 31 - 40 years constituting 19.4% (151) and 11-20 years 17.6% (137) (Table 3). Most of the victims were pedestrians 40.3% (314), followed by passengers 21.7% (169), motorcyclists 16.6% (129), pillion-mates 11.1% (87), drivers 7.2% (56) and cyclists 3.1% (24).

Table 3: Distribution of RTA victims by age and gender.

Age (Years)	Male	Female	Total
	N (%)	N (%)	N (%)
≤10	42 (6.5)	21 (15.6)	63 (8.1)
11 to 20	125 (19.4)	12 (8.9)	137 (17.6)
21 to 30	157 (24.4)	17 (12.6)	174 (22.3)
31 to 40	118 (18.3)	33 (24.4)	151 (19.4)
41 to 50	94 (14.6)	18 (13.3)	112 (14.4)
51 to 60	65 (10.1)	27 (20.0)	92 (11.8)
61 to 70	36 (5.6)	5 (3.7)	41 (5.3)
>70	7 (1.1)	2 (1.5)	9 (1.2)
Total	644 (82.7)	135 (17.3)	779 (100.0)
Mean±SD	33.7±17.0 (1, 85)	35.9±18.7 (2, 80)	34.1±17.3 (1, 85)

Out of 779 RTA victims Head on collision was reported by 62.9% (490) followed by roll overs in 13.9% (108) and side collisions in 8.7% (68). Only 6.8% (53) had run off road, 4.7% (37) having fall from a moving vehicle and 3% (23) rear-end collisions. It was observed that in more than half of the total victims i.e. 52.2% (407) four wheeled vehicles were responsible for accidents followed by 2-wheeled vehicles in 39.9% (311), 3-wheeled vehicles in 7.2% (56) and others 0.7% (5). 97.6% (760) victims were grievously hurt followed by simple injuries in only 2.4% (19).

On analysing the pattern of injuries, it was observed that head was the most affected part of the body in 59.9% (467) followed by lower limbs 59.4% (463) and upper limbs 26.8% (209) while injuries on neck, chest, spine and vertebral column were less common. 47% (366) had multiple injuries (Table 4).

Table 4: Distribution of RTA victims by part of body involved.

Part of body involved	N (%)
Head	467 (59.9)
Neck	25 (3.2)
Chest	57 (7.3)
Abdomen	45 (5.8)
Upper limbs	209 (26.8)
Lower limbs	463 (59.4)
Spine and vertebral column	20 (2.6)

73.7% (574) RTA victims received first aid following the accident. Among these, 96.2% (552) had received it at nearby Govt. Hospital, only 2.1% (12) had received it from nearby private hospital. Negligible number 0.7% (4) had received first aid at accident site or by Police 0.5% (3). The first aid was provided by doctors in majority i.e. 92.3% (530) of victims while in rest of the cases it was either provided by other health workers 7.2% (41) or police 0.3% (2) (Table 5).

Table 5: Distribution of RTA victims by details of receipt of first aid.

Category		N (%)
Any First Aid received	Yes	574 (73.7)
	No	204 (26.2)
	Don't know	1 (0.1)
First aid given at	Accident site	4 (0.7)
	Nearby Govt. Hospital	552 (96.2)
	Nearby Pvt. Hospital	12 (2.1)
	Police	3 (0.5)
	Others (specify)	3 (0.5)
	Total	574 (100.0)
First aid given by	worker	24 (4.2)
	Doctor	530 (92.3)
	Nurse	17 (3.0)
	Police	2 (0.3)
	Others (specify)	1 (0.2)

60.9% (474) were referred from government run hospitals. 23.7% (185) had come directly of their own whereas 14.4% (112) of victims in the study group constituted intra-referral cases within these three referral institutions. Merely 1.1% (8) were referred by private practitioners of the area (Table 6). Majority of the victims 68.5% (533) were transported to the referral hospital by ambulances followed by private vehicles in case of 29.5% (230). Police vehicle was used in just 1.4% (11). 66% (514) of RTA victims were brought to referral hospital by their family members followed by police in 17.6% (137) cases and persons known to them in 11.1% (87) cases. Only 0.4% (3) victims had reported on their own.

Table 6: Distribution of RTA victims by source of referral.

Source of referral	N (%)
Government hospital	474 (60.9)
District Hospital	249 (32.0)
Sub-District Hospital	92 (11.8)
Primary health centre	133 (17.1)
Private hospital	6 (0.8)
General practitioner	2 (0.3)
Directly on their own	185 (23.7)
Others (specify)	112 (14.4)
Total	779 (100.0)

Majority i.e. 65% (506) had visited two hospitals, 22.0% (172) only one hospital. However, 12.6% (98) had visited three hospitals and 0.4% (3) four hospitals (Table 7). It was observed that majority of victims 84.1% (655) were in a non-comatose condition with conscious level of 8-15 whereas 15.9% (124) were in comatose condition with conscious level of ≤8.

Table 7: Distribution of RTA victims by number of health facilities visited.

Number of hospitals visited	N (%)
1	172 (22.0)
2	506 (65.0)
3	98 (12.6)
4	3 (0.4)
Total	779 (100.0)

Major intervention was done in 64.4% (502) victims and intervention was started within half an hour of reporting to hospital in 92.8% (723) victims. In 5.3% (41) intervention was delayed for more than two hours. 62.8% (489) had external blood loss, 47.8% (372) needed blood transfusion and 65.2% (508) needed surgical intervention (Table 8). Out of 779 studied RTA victims 88.3% (688) survived and 11.7% (91) died (Figure 1).

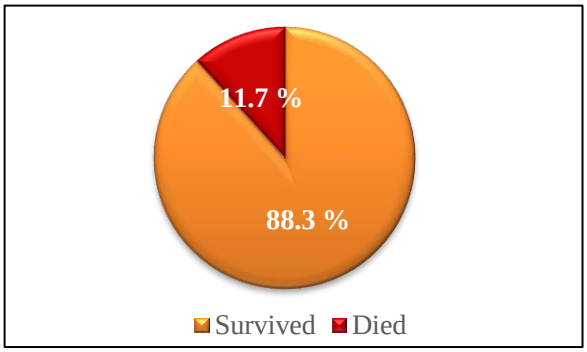

Figure 1: Pie chart showing distribution of RTA victims by outcome at 30 days.

Table 8: Distribution of RTA victims by details of interventions at referral care hospital (n=779).

Category		N (%)
Intervention	Minor	277 (35.6)
	Major	502 (64.4)
Intervention started at (hour)	½	723 (92.8)
	½ -1	12 (1.5)
	1-2	3 (0.4)
	2	41 (5.3)
Blood transfusion	Given	372 (47.8)
	Not given	407 (52.2)
Surgical intervention	Needed	508 (65.2)
	Not needed	271 (34.8)
Visible external blood loss	Yes	489 (62.8)
	No	290 (37.2)

The outcome was significantly adverse (increased mortality) in relation to type of vehicle, body part injured (head, chest, lower limbs and multiple injuries), number of body parts injured, conscious level, type of intervention, blood transfusion and surgical intervention. But it was found to be insignificant in relation to other factors like age, sex, occupation, type of victim and seat belt etc. (Table 9).

Table 9: Bivariate outcome analysis in relation to various factors.

Factors			Survived		Died		Chi square, d.f./ p value
			N	%	N	%	
Vehicle type	Four wheeler		348	85.5	59	14.5	X^2=6.91, d.f.=3
	Three wheeler		51	91.1	5	8.9	0.011 (Sig)
	Two wheeler		284	91.3	27	8.7	
	Others		5	100	0	0	
Body part injured	Head	No	303	97.1	9	2.9	X^2=37.63, d.f.=1
		Yes	385	82.4	82	17.6	0.000 (sig)
	Chest	No	646	89.5	76	10.5	X^2=11.28, d.f.=1
		Yes	42	73.7	15	26.3	0.000 (sig)
	Lower limbs	No	257	81.3	59	18.7	X^2=24.05, d.f.=1,
		Yes	431	93.1	32	6.9	0.000 (sig)
	Multiple injuries	No	375	90.8	38	9.2	X^2=4.74, d.f.=1, 0.022
		Yes	313	85.5	53	14.5	(sig)
Number of body parts injured	1		375	90.8	38	9.2	X^2=9.48, d.f.=3
	2		207	85.5	35	14.5	0.023 (sig)
	3		94	87.9	13	12.1	
	4		12	70.6	5	29.4	
Type of intervention	Minor		263	94.9	14	5.1	X^2=18.30, d.f.=1,
	Major		425	84.7	77	15.3	0.000(Sig)
Blood transfusion	Given		295	79.3	77	20.7	X^2=54.46, d.f.=1,
	Not given		393	96.6	14	3.4	0.000 (sig)
Surgical intervention	Needed		431	84.8	77	15.2	X^2=16.15, d.f.=1,
	Not needed		257	94.8	14	5.2	0.000 (sig)
Conscious level	≤8		45	36.3	79	63.7	X^2=380.96;d.f.=1,
							0.000 (sig)

DISCUSSION

During our study the magnitude of RTA victims at the three major tertiary care hospitals during the study period was 3531. Out of these, SKIMS has registered maximum RTA victims, due to the fact that it is the only referral tertiary care hospital with almost all super specialty facilities and trauma care facilities, hence a preferred choice of accident victims as well as for referrals from other health facilities. Males were predominantly affected (82.7%) also it was observed that 82% RTA victims were fifty or less than fifty years of age, the most productive age group of the population. Preponderance of male and young people could be explained on the basis that they are active bread winners of the family at least in this part of the globe and venture out in search of livelihood outside their homes and females mostly remain at home. Similar observations were made by Mashreky et al who found that 70% of the RTI were constituted by the people aged 18-45 years.[5] Sing et al also in his study report that adults working in the age group 18 to 60 years accounted for more than 80% of all casualties.[6]

More than 2/3rd (70.5%) of the accident victims in our study group were literate. Students constituted 24% followed by service class (17.1%) and business class (14%). These findings are supported by studies by Chalya et al who observed students (58.8%) and businessmen (35.9%) as the majority of road traffic crash victims and Kaul V et al who report 80% of RTA victims as educated.[7,8] Jha et al show labourers as commonest affected class (27.6%) followed by students (24.1%).[9] Verma et al in a study in Delhi found the business group had a higher incidence (IR=44) followed by the service group (40.1) and the labour group (IR=28.9).[10]

Head on collision (63%) remains the commonest type of accident in the present study followed by rollover in 13.9% and side collision in 8.7%. Almost similar findings were also reported by Dandona et al where collision with a vehicle caused 86.4% of all crashes.[11] Ahmad et al report hit pedestrian as the most common (39%), followed by head on collision (20%) and Sheikh et al also reports fatal hit pedestrian as the main collision type accident.[12,13] In contrast Ganveer et al report sideways collision (63.59%) as the commonest type of accident while as Jha et al report being knocked down as the common mode of accident in their study.[14,15]

97.6% (760) of the injured in the study group were grievously hurt and only 2.4% had simple injuries. Head injuries (60%) were the most common followed by lower limbs 59.4% (463) and upper limbs 26.8% (209) and 47% (366) victims had multiple injuries. Khare et al in 1268

studied cases report head injury (64%) as the most common injury in RTA cases. Mishra et al has also found head injury (43.33%) cases as highest with its case fatality rate as 90.9%.[16,17] Fitzharris et al report that open wounds and superficial injuries to the head (69.3%), upper extremity (27%) and lower extremity (24%) were the most common injuries.[18] Jeffrey et al also observed that head injuries were more common among pedestrians and pedal cyclists, while car occupants more often suffered injuries to the thorax and abdomen/lower back/lumbar spine.[19] In contrast Khajuria et al in their study found limb injuries constituted (31.08%) of the total injuries, followed by injuries involving head, thorax, abdomen, pelvis and spine.[20] Health seeking behaviour of accident victims revealed that 73.7% victims had received first aid which was mostly provided by doctors (92.3%) at government hospitals (96.2%). Negligible number 0.7% had received it at accident site. 61% of victims were referred from government hospitals mostly in ambulances (68.4%), with 2/3rd (66%) of them being accompanied by family members. 84 % of the victims were received at referral institution in a non-comatose condition with a Glasgow coma score of 8-15. Vide range of variation has been observed in receipt of first aid by accident victims. Shyngle et al report that only 4.9% of the victims had first aid treatment at the scene of the accident. Kaul et al reported that 43% of the people did not receive treatment within three hours, while only 23% had received first aid.[21,22] Mishra et al concluded that 59.16% victims received first aid.[23] Kaul et al report 21% of the cases were brought to the hospital by the highway or state police, with more than half of the patients being brought by co-passengers or passers-by.[22] Fitzharris et al show that the majority (77%) of RTA victims had Glasgow coma score (GCS) of 13-15, 12% a GCS of 9-12 and 11% a GCS of 3-8.[24]

Although in 94.3% victims intervention was started within an hour of reporting to hospital showing promptness of service at final destination, 78% of them had visited more than one hospital showing time lost by these victims in seeking appropriate care which could have been avoided by proper referral. Major intervention was done in 64.4% victims and in majority 92.8% intervention was started within half an hour of reporting to hospital. 62.8% (489) had external blood loss, 47.8% (372) needed blood transfusion and 65.2% (508) needed surgical intervention. Verma et al report majority of victims (92.4%) received treatment within 6 hours while 70% availed treatment within 1 hour of injury.[25]

Out of 779 studied RTA victims in our study 11.7% (91) died within 30 days compared to Khare et al who report overall mortality among RTA cases at tertiary care centres as 3.15%.[26]

CONCLUSION

The study revealed that accidents occur not only due to ignorance but also due to carelessness, thoughtlessness and over confidence. Human, vehicular and environmental factors play important role before, during and after RTA. Road traffic injuries are partially predictable and hence preventable.

ACKNOWLEDGEMENTS

Authors would like to thank Medical record departments and staff of accident and emergency of all three referral hospitals of Kashmir valley for their valuable support during the data collection phase of this research.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Bhat MA, Iqbal QM. Injury pattern and outcome of road traffic accident victims attending major referral institutions of the Kashmir valley. Int J Community Med Public Health 2020;7:958-64.