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Study Of Mechanism Of Injury, Pattern Of Injury And Mode Of Transport Influencing Outcome Of Trauma Patients At Level I Trauma Center: A Retrospective And Prospective Observational Study

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ABSTRACT

Approximately 1.19 million people die each year as a result of road traffic crashes. Road traffic injuries are the leading cause of death for children and young adults aged 5–29 years. 92%t of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have around 60% of the world's vehicles.In this we understand major mechanism of injury and to correlate with anatomical injury and to study pattern of injuries and their outcome. This retrospective prospective observational study was done in department of Emergency Medicine in of Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow. It was carried out for 18 months. All trauma patients attending surgical causality, department of trauma surgery, orthopedic, male and female both were included.Patient leaves against medical advice, absconded patient, referred to another center were excluded.150 retrospective and 150 prospectivepatients taken in this study.Male were more common in our study. Only 33.63% patients were used safety device. Two wheelers and drivers were more affected in RTA. In our study maximum patients were reach our hospital after 24 hours and mode of transportation was use Government Ambulance or private vehicle. Most of the patients given first add in Government Hospital/Clinic by paramedical staff or doctor and referred from government hospital. Head was the most injured part observed in our study. Most of the patients were admitted and thereafter discharged from our hospital. We observed no differences in hospital complications between patients. Further investigation is warranted to identify the underlying causes of complications to facilitate reduction and improve patient outcomes. Increasing awareness of the EMS contact number may increase EMS utilization. Finally, effective preventive programs to prevent MVC are desperately needed reduce associated complications and improve population health.

IED: Improvised Explosive Devices, ATLS: Advanced Trauma Life Support, CO: Cardiac Output, SNS:Sympathetic Nervous System, SVR: Systemic Vascular Resistance, BAC: Blood Alcohol Concentration, GSW: Gunshot Wounds, LOS: Length of Stay, TCD: Transcranial Doppler

1. INTRODUCTION

Approximately 1.19 million people die each year as a result of road traffic crashes. Road traffic injuries are the leading cause of death for children and young adults aged 5–29 years. 92%t of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have around 60% of the world's vehicles. More than half of all road traffic deaths are among vulnerable road users, including pedestrians, cyclists and motorcyclists. Road traffic crashes cost most countries 3% of their gross domestic product. Males are typically 3 times more likely to be killed in road crashes than females. India road traffic is responsible for 15 to 50% of all injury systematic collection of road traffic accident data is not well established in developing countries like India therefore exact occurrence and burden of the disease is not known whatever data is available regarding road traffic injury is of national crime report which seems to be tip of an iceberg as many of accident and death remain unreported. (9,10)

Published reports suggest emergency medical services are associated with improved outcomes because of early on-scene stabilization before transport and less treatment time due to early.In this we understand major mechanism of injury and to correlate with anatomical injury and to study pattern of injuries and their outcome.

Aims: To understand major mechanism of injury and to correlate with anatomical injury, pattern of injuries and their outcome.

Long term objectives

- To develop pre hospital care system in UP.
- To develop trauma registry in state of UP.

2. MATERIAL AND METHODS

This retrospective prospective observational study was done in department of Emergency Medicine at Dr Ram Manohar Lohia Institute of Medical Sciences, Lucknow. It was carried out for 18 months. The study protocol was approved by Institutional Ethics Committee, Dr Ram Manohar Lohia Institute of Medical Sciences, Lucknow. Informed consent was obtained from the patients recruited in the study.

Inclusion criteria

- All trauma patients attending causality, department of Emergency Medicine/orthopaedic.
- Male and Female both were included.
- Patient willing to participate in their study.

Exclusion criteria

- Patient leaves against medical advice
- Absconded patient
- Referred to another center

Methodology

A pre-structured proforma were used to collect the required data which was include demographic profile of patient, Mechanism of injury, Use of safety devices, distracting factors, pattern of injury/injuries sustained, mode of transport, care during transport, time since injury, in hospital care. This proforma was filled by health care professionals

Sample size

- The sample size was calculated to be 150 retrospective +150 prospective

Data was collected on same working shift duty to enhance the accuracy. Training for project personnel was carried out at the institute of the principal investigator. Data collectors were sitting in the emergency medicine department for 24/7 on shift duties and record patient details into the prescribed registry proforma. In level II and level III centres, the emergency staffwas collect data in the registry proforma. These data were transferred into the online registry.The data management training includes training on data dictionary (ICD, AIS), various types of data coding, injury severity scoring and training on other data management tools also be undertaken for research personnel. This is aimed not only to help in the current project but also to help in capacity building for future trauma registries.

Data collection: Registry data collection was done by research personnel under the supervision of the guide and other senior staff based on the preset registry proforma. The proforma used for trauma registry is appended to this paper as Appendix.

(III) Intervention: The intervention phase was last for 6 months and shall includeeducation of the first responders,prehospital notification training, acute trauma care training and improving the quality of care.

(a) Education of the first responders: The intervention in this study is to educate and train the first-responders like ambulance or emergency medical technician personnel, police and fire and safety services staff. The training includes basic education on the initial assessment of a trauma patient in the form of AIIMS Trauma First Responder (TFR) course. The training will be for 6–8 hours for one day conducted once every month for 6 months during the intervention period.

(b) Prehospital notification training: The recipient hospital needs to be notified about patient's basic injuries and vitals while en-route, so that the receiving hospital has enough time to assemble a team, which is ready to receive and treat the patient upon arrival. Hospital issued mobile phones, with a dedicated toll-free number as part of the intervention. Panels comprising representatives of trauma hospital and feeding pre-hospital providers would be convened and, locally-tailored protocols and forms for the following made:

- notification that specifies about whom, to whom and when the notification should be given, and what information should be communicated;
- responding at the receiving end, in particular assembling a receiving trauma team for cases requiring immediate

resuscitation;

- documentation of call details, including the time of call, the information provided, and perceptions of its utility and any care that ensued; and
- structured handover upon arrival to the hospital.

Course was conducted providing training to the doctors and nurses catering to the RTI victims. ATAM would be held once every month at the level I hospital for a total duration of 6 months during the intervention phase,which provides structured training in acute trauma management with special emphasis on skills training. Pre and post-test was conducted with each course as a part of a quality improvement (QI) programme.

QI activities implemented according to the WHO guidelines to become focal points for training in their region. The intervention include the WHO trauma QI training course for key clinicians and administrators, conducted during the first six months, followed by mentoring of development of the necessary structures and processes to conduct regular mortality and morbidity (M & M) meetings, preventable death reviews, audit filters, risk-adjusted benchmarking of key performance indicators where relevant and loop closure. The trainers and mentors were drawn from the project leadership team.

(IV) Impact evaluation: Post-intervention trauma registry data collection would be carried out for 12 months after the intervention phase. Internal and external quality assurance would be carried out on a monthly basis. As mentioned at every stage of the study, the impact of the intervention will be measured through various outcome indicators, including the patients' outcome like death, length of stay in hospital, morbidity, disability, etc. The necessary data for an impact evaluation will be obtained through the registry. Both pre- and post-intervention comparisons among various outcome variables will be made.The Statistical analysis was conducted on SPSS software windows version 21. The ANOVA test was used for univariate analysis. The chi square test was used for comparison. A P value of <0.05 was considered significant. Microsoft excel worksheet version 21 used for data collection. Nominal data was presented as percentage.

3. OBSERVATIONS AND RESULTS

The retrospective and prospective observational study study was conducted in Department of Trauma Surgery, King George's Medical University, Lucknow with the aims to understand major mechanism of injury and to correlate, with anatomical injury and to study pattern of injuries and their outcome as per after getting approval a total 70 patients were included in this study as per inclusion and exclusion criteria and divided into two groups as below:

Table 1: Gender Distribution of patients

Gender	**No of Subjects**	
Male	1393	73.3
Female	507	26.7
Age group		
14 - 25 years	696	36.63
26 - 45 years	621	32.69
46 - 64 years	285	15
above 64 years	298	15.66
Pre hospital information		
Received	80	4.22
Not received	1820	95.78
Brought by		
Family/Relative	709	37.31
Known Person	363	19.10
Bystander	334	17.57
Police	191	10.05

Other	303	15.94
Mechanism of Injury		
Blunt	1633	85.94
Penetrating	121	6.36
Mixed	146	7.68
Uses of safety device		
Yes	639	33.63
No	1261	66.36

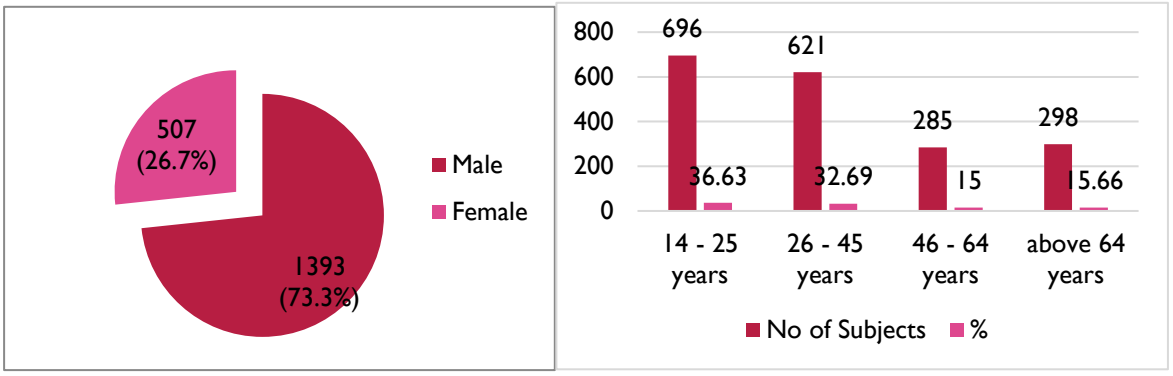

Figure 1: Gender and age group Distribution of patients

Table 1 shows that among 1900 subjects, 1393 (73.3%) subjects were male and 507 (26.7%) subjects were female. Out of 1900 subjects, 696 (36.63%) subjects were between 14 to 25 years age group, 621 (32.69%) subjects were between 26 to 45 years age group, 285 (15.00 %) subjects were between 46 to 64 years age group, 298 (15.66 %) subjects were above 64 years age group. Only 80 (4.22%) subjects were received pre hospital information, where 1820 (95.78%) subjects were not received pre hospital information. 709 (37.31%) patients brought by family/relatives,363 (19.10%) patients brought by known person, 334 (17.57%) patients brought by bystander, 191 (10.05%) patients brought by police, 303 (15.94%) patients brought by other/ unknown person. In this study 1633 (85.94%) subjects had blunt injury, 121 (6.36%) subjects had penetrating and 146 (7.68%) subjects had mixed injury.

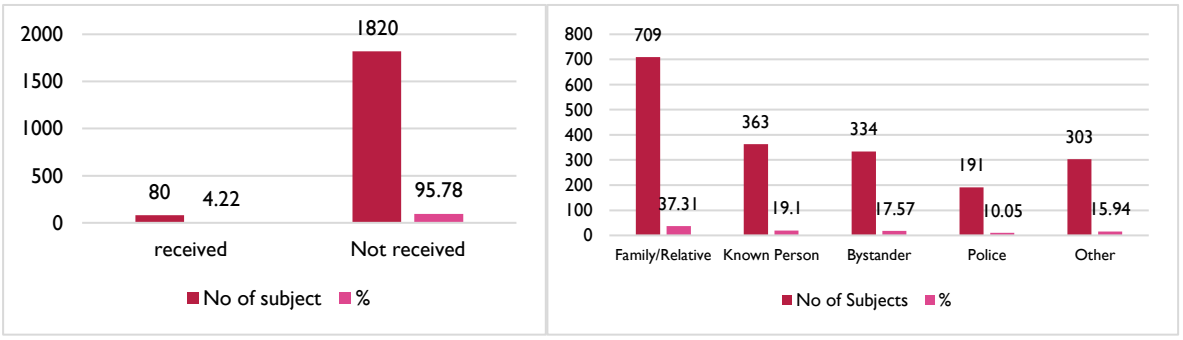

Figure 3: Pre hospital information of patients

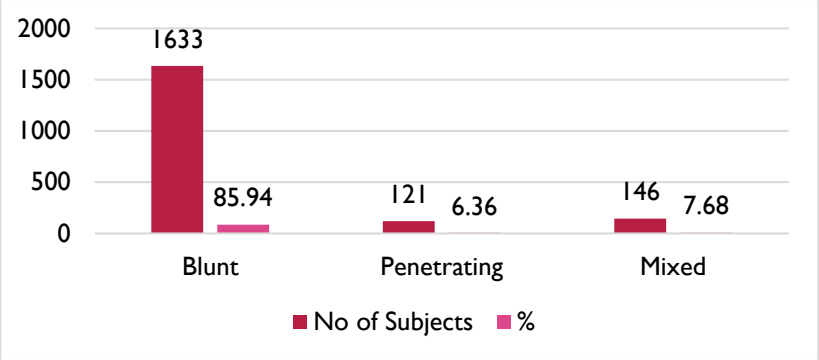

Figure 5: Mechanism of Injury

Table 2: Uses of safety device

Uses of safety device	**No of Subjects**	**%**
Yes	639	33.63
No	1261	66.36
Type of Collision		
Hit Pedestrian	233	12.26
Head on collision	195	10.26
Hit from back	89	4.68
Skid	138	7.26
Hit from side	108	5.68
Nose to tail collision	133	7
Hit and run	214	11.26
Hit fixed object	158	8.32
Hit animal	240	12.63
Over turn	146	7.68
Fall from moving vehicle	133	7
Other	113	5.95
Duration to reach hospital		
0 to 1 Hour	58	3.00
01 hour to 8 hours	451	23.73
8 hour to 24 hours	623	32.78
After 24 hours	768	40.42
Was patient on life support		
Intubated	134	7.05
IV Fluid	1539	81
Monitoring	259	13.63
Infusion of drug	1211	63.73

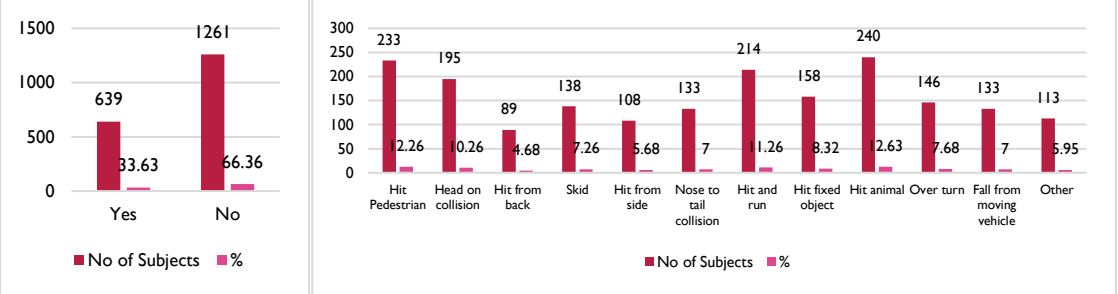

Figure2: Uses of safety device and Type of Collision

Table 2 shows that out of 1900 subjects only 639 (33.63%) subjects were uses safety device and 1291 (66.36%) subjects were not uses any safety devices. The maximum type of collision was Hit Pedestrian (13.26%) and Hit animal (12.63%), where minimum type of collision was Hit from back 89 (4.68%). most of the patients reach hospital after 24 hours. Out of 1900 patients 58 patients reach hospital within one hour, 451 (23.73%) patients reach hospital within one hour to 8 hours, 623 (32.78%) patients reach hospital between 8 to 24 hours and 768 (40.43%) patients reach hospital after 24 hours.

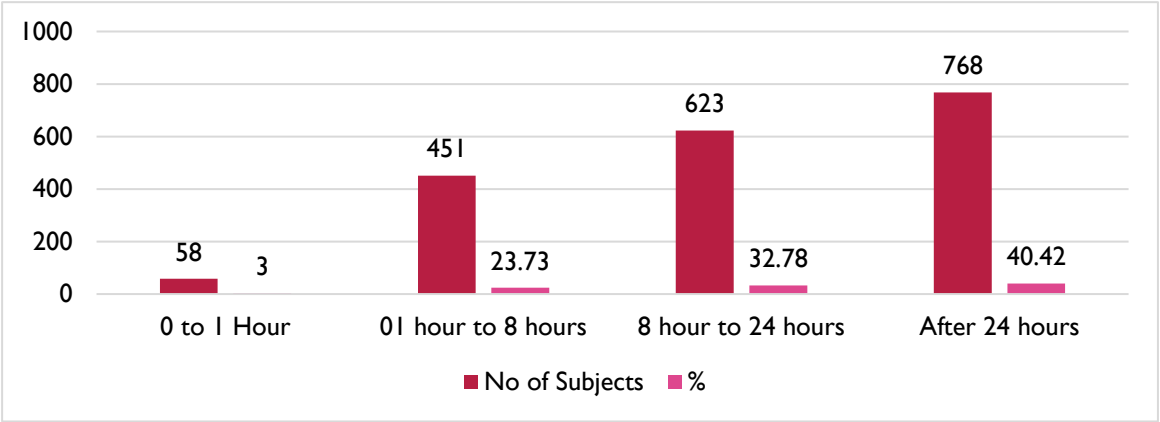

Figure10: Role of patients on accident

Table 12: First aid Given on the way

First aid Given	**No of Subjects**	**%**
Yes	1171	61.63
No	728	38.31
First aid site		
Onsite	129	11.09
Ambulance	238	20.32
Private Hospital/Clinic	342	29.24
Government Hospital/Clinic	359	30.66
Other	103	8.80
First aid Given by		
Doctor	378	32.28
Police	120	10.24
Nurse/paramedical	519	44.32
Others	247	21.09

Was patient on life support		
Intubated	134	7.05
IV Fluid	1539	81
Monitoring	259	13.63
Infusion of drug	1211	63.73

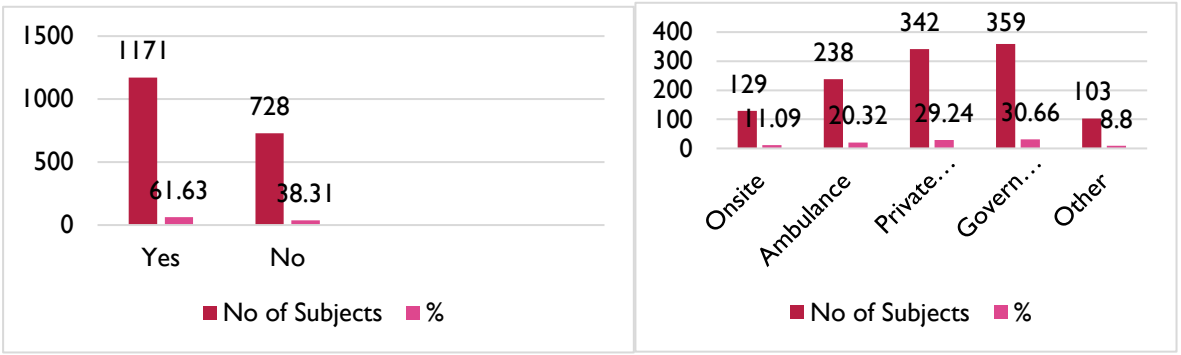

Figure 12: First aid given on the way and First aid site

Table 3 shows that most of the patients were take first aid (1171 (61.63%), where 728 (38.31%) patients were not take first aid. most of the patients first aid site was Government Hospital/Clinic (30.66%), private hospital/ clinic was 342 (29.24%), Ambulance was 238 (20.32%), onsite was 129 (11.09%) and other was 103 (8.80%). Most of the patients first ad given by Nurse /paramedical staff (44.32%) and Doctor (32.28%). In our study out of 1900 patients, 134 (7.05%)patients were intubated, 1539 (81.0%) patients were on IV fluid, 259 (13.63%) patients uses monitoring and total of 1211 (63.73%) patients were on infusion of drug which was maximum life support,.

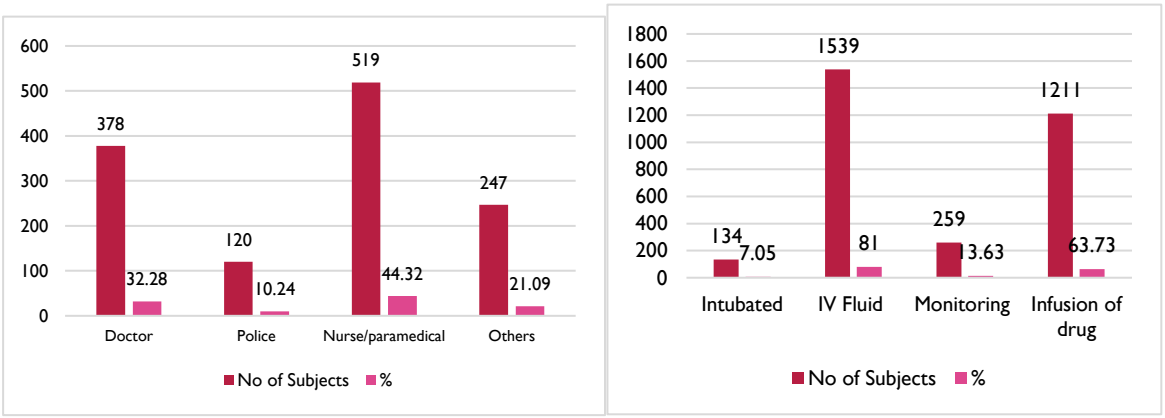

Figure14: First aid given by and Was patient on life support

Table 4: Injured Body region and Hospital deposition

Injured Body region	No of Subjects	%
Head	521	27.42
Chest	259	13.63
Abdomen	139	7.31
Spine Injury	101	5.31

Pelvic	153	8.05
Upper extremity injury	215	11.31
Lower extremity injury	291	15.31
Polytrauma	221	11.63
Hospital disposition		
Admitted	690	36.31
Discharged	475	25
Transferred to other hospital	387	20.36
Lama	101	5.31
Abscond	57	3
Death	146	7.68
Not recorded	44	2.31

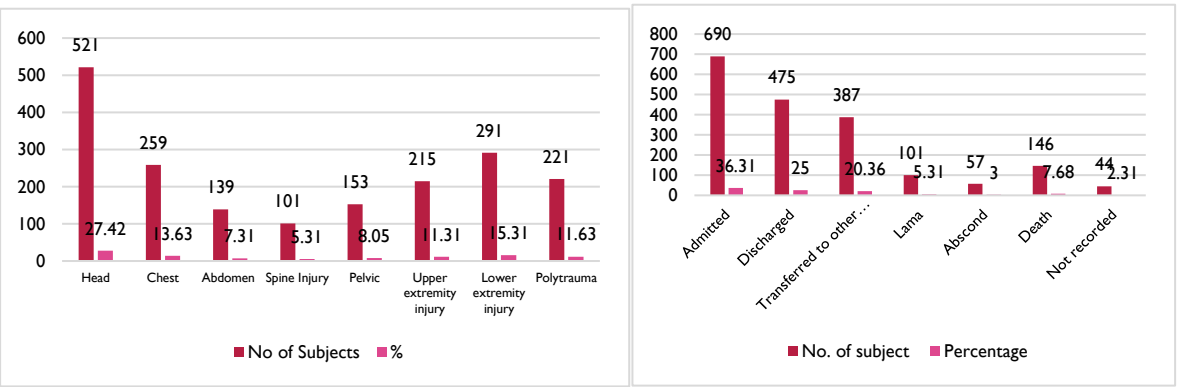

Figure 4: Injured Body region&Hospital disposition

Table 4 shows that Head injury (27.42%) was more common in all over 1900 patients and 690 (36.31%) patients were admitted, 475 (%) patients were discharged, 387 (20.36%) patients were transferred to other hospital, 101 (5.31 %) patients were LAMA, 57 (3%) were abscond 146 (7.68%) patients were death and no record found of 44 (2.31%) patients.

4. DISCUSSION

This retrospective prospective observational study was done in emergency department of trauma surgery, neurosurgery unit orthopedic unit in level 1 trauma patient at King Georges Medical University, Lucknow. The study protocol was approved by Institutional Ethics Committee, King George's Medical University, Lucknow. Informed consent was obtained from the patients recruited in the study. This study will provide comprehensive epidemiology and outcome of RTIs. Currently, in India, the EMS are fragmented and a few states have recently implemented a version of EMS that responds to a toll-free call for the medical emergencies.

In our study among 1900 subjects, 1393 (73.3%) subjects were male and 507 (26.7%) subjects were female. In the study of Alansari et al. the 82% subjects were male which is almost similar to our study.

out of 1900 subjects, 696 (36.63%) subjects were between 14 to 25 years age group, 621 (32.69%) subjects were between 26 to 45 years age group, 285 (15.00 %) subjects were between 46 to 64 years age group, 298 (15.66 %) subjects were above 64 years age group in our study, in support of our study almost similar results is demonstrated in Consunji R,. et al where maximum age groups is 20 to 40 years of age.

Previous studies conducted across the Arabian Gulf region reported that male child is more likely to incur traumatic injuries, perhaps because of greater involvement in physical contact sports, risk-taking behaviour, and higher levels of aggression. Consistent with these findings, our results also demonstrated male predominance in pediatric trauma. In our study, the main

mechanisms of injury were blunt, which contributed almost equally in proportion, 85%. Pedestrian injuries were more fatal and accounted for almost one out of eight cases. Consunji[5] et al. previously studied pediatric RTIs in Qatar and demonstrated that 54% of the RTIS were due to MVCs and a quarter of RTIs were due to pedestrian injuries. Mention, 14% of the total RTIs were caused by All-Terrain Vehicle-related accidents. Grivna et al. (12) studied pediatric trauma patients (0–19 years) injured by RTIs in the United Arab Emirates (UAE) and found that MVCs (70%) were the main cause followed by pedestrian injuries (15%).

In our study only 33% subjects were used safety device. In the study of Alansari et al. only 28.3% subjects were used any safety devices which was similar. Out of1900 subjects vehicle of 233 (12.26%) subjects were have pedestrian, vehicle of 652 (34.31%) subjects were M2W/pedal cycle , vehicle of med 399 (21%) subjects were M3W, venicle of 266 (14%) subjects were Car/Van car, trank/Bus of 154 (8.1%), vehicle of 196 (10.31%) subjects were chosen other type.

In our study maximum out 1900 subjects the maximum type of collision was Hit Pedestrian (13.26%) and, minimum type of collision was 89 (4.68%). In the study of Razzak JA minimum collision was 16.3% which is almost similar to our study.

Studies from other countries reported a shorter response time. A study from Iran showed most EMS calls were delivered within 8 minutes,36 while in Beijing the median response time was about 16.5 minute.37 Clearly, further studies are needed to evaluate response time and associated complications in Saudi Arabia among trauma patients.

In our study out of 1900 patients, 134 (7.05%)patients were intubated, 1539 (81.0%) patients were on IV fluid, 259 (13.63%) patients uses monitoring and total of 1211 (63.73%) patients were on infusion of drug which was maximum life support,. In the study of Sharma M et al maximum uses of life support was IV fluid (87.3%) which comparable to our findings. Mekkodathil A, et al also resulted IV fluid was a common support to treat patients.

In our study maximum cases of patients were driver 804 (42.31%). In the study of Mekkodathil A, et al also resulted driver was more common (41.3%) to others which is almost similar findings to us.

5. CONCLUSION

Male were more common in our study. Only 33.63% patients were used safety device. Two wheelers and drivers were more affected in RTA. In our study maximum patients were reach our hospital after 24 hours and mode of transportation was use Government Ambulance or private vehicle. Most of the patients given first in Government Hospital/Clinic by paramedical staff or doctor and referred from government hospital. Head was the most injured part observed in our study. Most of the patients were admitted and thereafter discharged from our hospital. We observed no differences in hospital complications between patients. Further investigation is warranted to identify the underlying causes of complications to facilitate reduction and improve patient outcomes. Increasing awareness of the EMS contact number may increase EMS utilization. Finally, effective preventive programs to prevent MVC are desperately needed reduce associated complications and improve population health.

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