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Research Article

Chest Injuries By Blunt Objects

Study on Chest Injuries Due to Blunt Object in Road Accident

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Abstract: In India, people use local transport for travel. Since accidents prevail in these developing countries, India is not exceptional. The number of vehicle increases daily, and road accident occurs every two minutes. Chest injuries are widespread during accidental cases. This significantly contributed to the trauma during unintentional cases. Trauma generally affects young adults. Based on the above facts, the present study aims to determine the pathologies associated with chest injuries due to blunt objects in road accidents and to assess the blunt chest injuries among accident victims traveling in different road transportation modes and furthermore, to observe the injury pattern and its correlation with the victim's position during the road traffic accident. The study was carried out in the Branch of FMT, Raj Rajeswari Medical College and Hospital Bangalore. Data were collected from 100 cases of death caused by a road traffic accident that was presented for medico-legal post-mortem at the mortuary in the FMT department from December 2013 to May 2015. The study reports the maximum number (42%) of chest injuries occurred between the age group of 21-30 years, followed by 24% in the age group 31 – 40, with a maximum (62%) accidental cases in two-wheeler riders. The result showed that 48% of patients had rib fractures, 12% vertebral fractures, 10% sternum fractures, and 4% clavicle fractures during accidental cases, with haemothorax in 56% of cases. The result also showed that death was due to shock and hemorrhage in 92 patients and 6% due to coma. Specific injury prevention programs focusing on road safety should be implemented to limit and control the incidence of such injuries in light of our results.

Keywords: Road Accidents, Blunt Objects, Chest Injuries, Medico-Legal Autopsy, and Trauma.

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1. INTRODUCTION

Chest injuries are common injuries during accidental cases. It was a significant concern in the trauma during road accidents. The study observed that ninety patients were chest injuries from April 1993 to March 1998.[1] Trauma is the third leading cause of death in 40 years in the United States; approximately 25% of the patients with traumatic deaths were reported out of one lakh annually. Blunt thoracic injuries are the most common cause of chest trauma[2]. Mechanized transportation media like vehicles, trains, planes, and so forth was used for transportation. The quick vehicular traffic, massive urbanization, fast industrialization, and similar development are rising. It may also expand the percentage of crime with the added movement. It has contributed to the expansion in the rate of injury to the human body.[3]. The World Health Organisation stated an accident as an "unexpected, unplanned occurrence that may involve injury ."In the 1990, 's Road accidents were one of the leading causes of death worldwide. If the current pattern persists, it was predicted to rank as the second leading cause of death until the year 2020.[5] Every year; road accidents take the lives of 1.2 million individuals around the World.[6] In 2002, the Global rate of deaths due to road accident injuries was about 19 per 100,000 people, with adults aged between 15 - 44 accounting for more than fifty percent of deaths.[6] One accident occurs every 2 minutes in India, corresponding to 2 to 45 per one lakh of the population. According to the national crime record, there were 4,43,001 road traffic accidents in India in 2013.[7] Trauma is one of the leading avoidable causes of demise in developing countries and is a significant health problem. Trauma generally affects young people and accounts for losing more years of life than lost due to heart disease and cancer. In India, reported 10.1% of deaths were due to accidents in 1997. Accidents are widespread in the civilized World. Our country is not an exception to this universal problem and has witnessed a steady increase in accidental trauma, currently ranking fourth among the chief causes of death[8]. Every year in India, about 1, 40,000 individuals die due to accidental deaths, and around two times more become disabled. This number is increasing day by day. In urban life, 75% of thoracic injuries occur through a blunted object. The most incredible difficulty in their management lies in the appropriate finding. This is mainly due to the masking of thoracic trauma and its associated injuries like head, abdominal and bony injuries injury[9,10]. In Karnataka state, chest trauma is one of the causes of mortality. The development of roads and transport rapidly occurs, and people have education regarding social awareness. This is an adverse effect of increased accidents in youths[11]. In Bangalore, vehicular motor accidents are one of the most contributory factors to chest injuries because of the increase in multiple vehicles, viz., running three different types of vehicles—power, body, and hand drove on the same road, increasing traffic on the road, particularly in the morning and evening during peak office hours, improper roadways, and poor public transportation maintenance. Young persons aged 20 to 40-year age range were involved in car accidents. Accidents in this group represent the heart-breaking loss to the family and severe economic loss to society. It encompasses a wastage of educational training, and they also lose productive years of life[12]. The vital organs in the chest cavity include the heart, lungs, large blood vessels, and supporting tissues. If the trauma occurs in this temperate region, this leads to challenges to the individual's integrity and viability. Because of the chest's highly exposed area and anatomical structural position, it is a highly exposed side of trauma in accidental cases. Chest injuries are widespread in accidents, but they are not always isolated. This is often associated with another organ, viz., head, abdomen, pelvis, spine, and other extremities. Hence, the presence of intra-thoracic participation may be observed in injured areas. Early detection of the injury and a direct line of treatment helps save the lives of many patients. Observing clinical signs and symptoms of the patients and repeated clinical examination of chest injuries are more critical than any other investigation[13,14]. Most deaths occur due to blunt objects during accidental cases. Therefore, it is essential to begin the death cause to get compensation from the State government and insurance services. Despite the social impact of a road accident, we get reliable data on accidental injuries or trauma due to blunt objects. In this study, we tried to establish a relationship between the extent, nature, type of chest injuries and other injuries to fatality, survival time, Age, sex, and kind of trauma involved. In light of our investigation, we propose different measures to limit and control such injuries. It will also highlight the necessity for the construction of trauma centers, where offices for first aid at the site of an accident, quick transportation from the accident site to the hospital, and other services will be provided. It will likewise accentuate the need to build up Trauma Centres where offices for revival at the site of injury, quick vehicles from the mishap site to the medical clinic, and so on will be given. These focuses will give better coordination of resuscitative and helpful measures. The role of advanced non-invasive methods in prompt diagnosis is vital for positive outcomes. The main objective of this study was to investigate the epidemiology associated with chest injuries due to blunt objects in a road accident, injury pattern, and outcome of patients suffering one or more road traffic accident (RTA) related thoracic injuries.

2. MATERIALS AND METHODS

2.1 Source of Data

The study was done in the department of Forensic Medicine, Raj Rajeswari Medical College, and Hospital Bangalore from December 2013 to May 2015. In this study, there were 100 cases of accidental deaths brought to the department for a Medico-legal autopsy at the mortuary in our department. The victim's Age, sex, the type of accident, the vehicle involved, the type of injuries caused to the victim, the location of the accident's impact with the car, the victim's place of death, the duration of the victim's survival after the incident, the circumstances surrounding the incident, and other pertinent information about the cases were collected from the Medico-legal documents from Karnataka police report (form number 146 (I) and 146(II) and detail concern information taken from constable, investigation officers and higher authorities. Other information was collected from the onsite witnesses during the accident, relatives, friends, attendants, and other accompanying persons with dead bodies. The detailed proforma of the patient's history, epidemiological data, and further details were prepared for the present study. A complete internal and external injuries examination was done on all dead bodies. It includes bone and joint fractures of the thoracic region.

2.2 Study Type

The Observation study was carried out in the department.

2.3 Study Design

It was a cross-sectional, experimental type study of injuries

involvement of organs, bony structure, type of pleural cavity, and mode of death. It was conducted from December 2013 to May 2015.

2.4 *Inclusion Criteria*

1. The cases with thoracic injuries caused by blunt force sustained in road traffic accidents were included.
2. The number of cases with blunt thoracic trauma by RTA, was brought dead to the hospital, and those that succumbed after treatment at RRMC &H were also included.

2.5 *Exclusion Criteria*

1. Strictly exclude decomposed bodies
2. The cases where the nature of sustenance of injury was not known

2.6 *Ethical Approval*

Study was approved by the institutional ethics committee approval number- ECR/56/inst/KA/2013 dated 5th November 2013. This study was reviewed and approved by Institutional ethical committee, all the informed consent form was taken from the patient's relatives, and clearances form were taken as per norms.

3. OBSERVATION AND RESULTS

The study was conducted in the FMT department Bangalore from December 2013 to May 2015; dead bodies were brought for the post-mortem inspection at RRMC & H with chest injuries by RTA.

Table 1: Age-wise distribution and number of cases involved in chest injuries.

Sr no	Age	Number of cases	Percentage (%)
1.	0-10	3	3
2.	11 --12	5	5
3.	21-30	42	42
4.	31-40	24	24
5.	41-50	14	14
6.	51-60	8	8
7.	>60	4	4
8.	Total	100	100

Table 1 illustrates the age group-wise distribution and the number of cases involved in chest injuries and its percentage. There were eight groups among which the ages 21 -30 and 30-40 were the maximum cases. It was observed from table 1 that the maximum number (42%) of chest injuries due to blunt trauma occurred between the age group of 21-30 years, followed by 24% in age group 31 – 40.

Table 2: Type of road users

Sr no	Type of road users	Number of cases	Percentage (%)
1	Pedestrian	20	20
2	Two-wheeler Rider	62	62
3	Two-wheeler pillion	6	6
4	Driver	2	2
5	Passengers	10	10
	Total	100	100

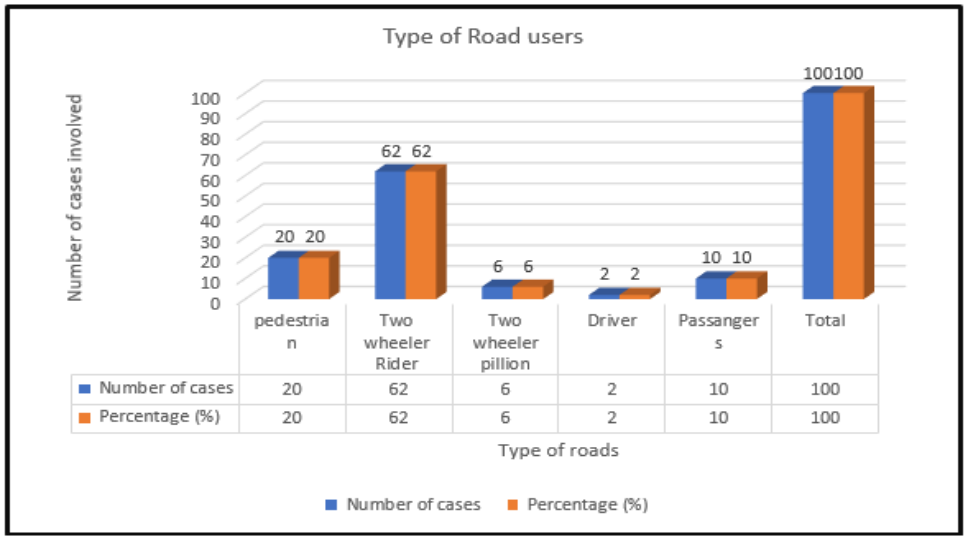

Fig 1: Type of road users

Table no 2 and fig 1, illustrates the type of road users involved in a road accident. The number of cases and their percentages of an accident. The maximum two-wheeler riders involved in road accidents. The above table mentioned that the type of road user has maximum (62%) accidental cases during driving of two-wheeler riders and pedestrians 20%.

Table 3: Bony structure involved in the accidental cases

Sr no	Bony Structures	Number of cases	Percentage (%)
1.	Rib	48	48
2.	Clavicle	4	4
3.	Sternum	10	10
4.	Vertebrae	12	12
5.	Combined	26	26
6.	Total	100	100

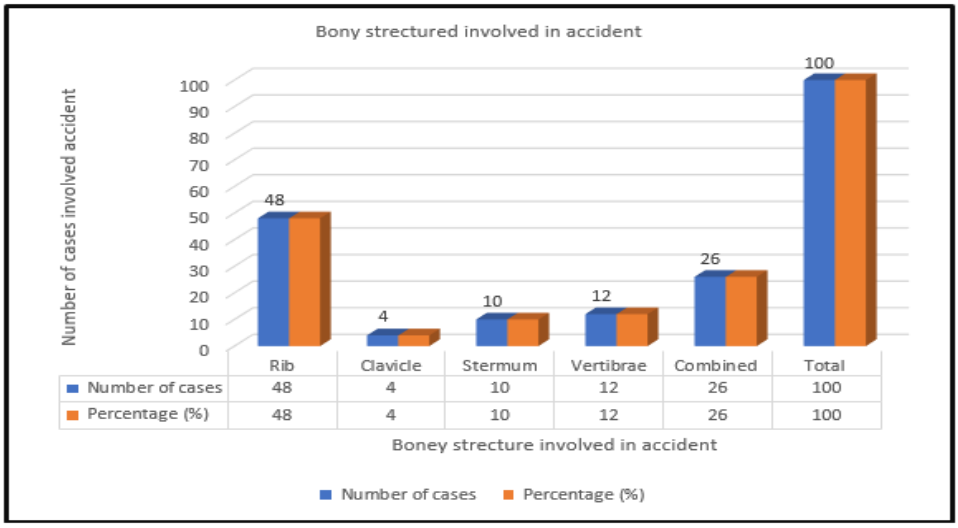

Fig 2: Bony fracture involved in the accidental cases

The above table 3 and fig 2 mentioned bony fracture involved in the accidental cases 48% people having rib, 12% vertebra involved and 10% sternum and only 4% was clavicle was fractured during accidental cases. The result indicates that maximum cases showed rib fracture (26%) in combined fracture injury.

Table 4: Condition of the pleural cavity in accidental cases

Sr no	Pleural Cavity	Number of cases	Percentage (%)
1.	Normal	44	44
2.	Haemothorax	56	56
3.	Pyothorax	0	0
4.	Pneumothorax	0	0
5.	Combined	0	0
6.	Total	100	100

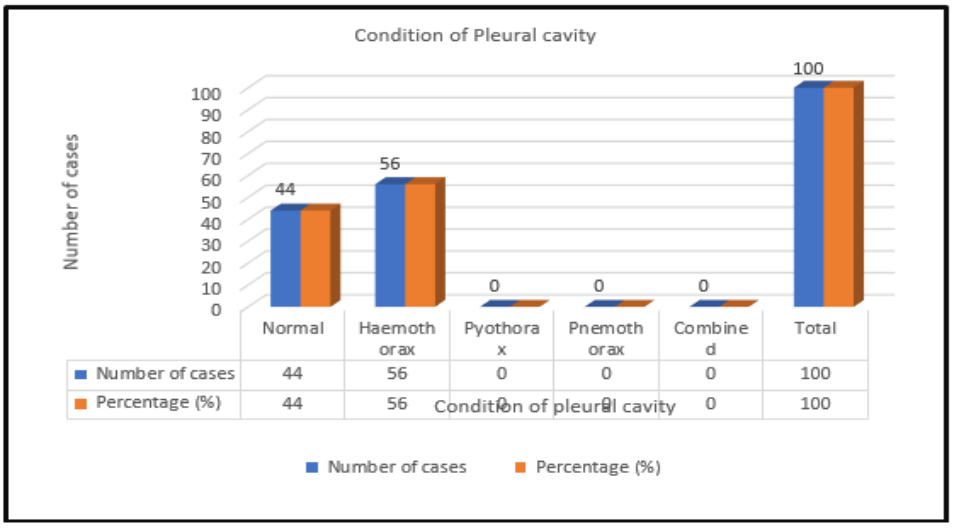

Fig. 3: Condition of Pleural cavity

Table 4 and Fig. 3 shows the condition of the pleural cavity in accidental cases, haemothorax in 56 people out of 100 was observed, which indicated haemothorax commonly observed in accidents.

Table 5: Type of organ involved in accidental cases

Sr no	Type of organ	Number of cases	Percentage (%)
1.	Lungs	44	44
2.	Heart	4	4
3.	Major blood vessels	2	2
4.	Combined	50	50
5.	Total	100	100

Table 5 illustrates the type of organ involved in accidental cases. The major vital organs involved were lung, heart and both in combined injured during the accident.

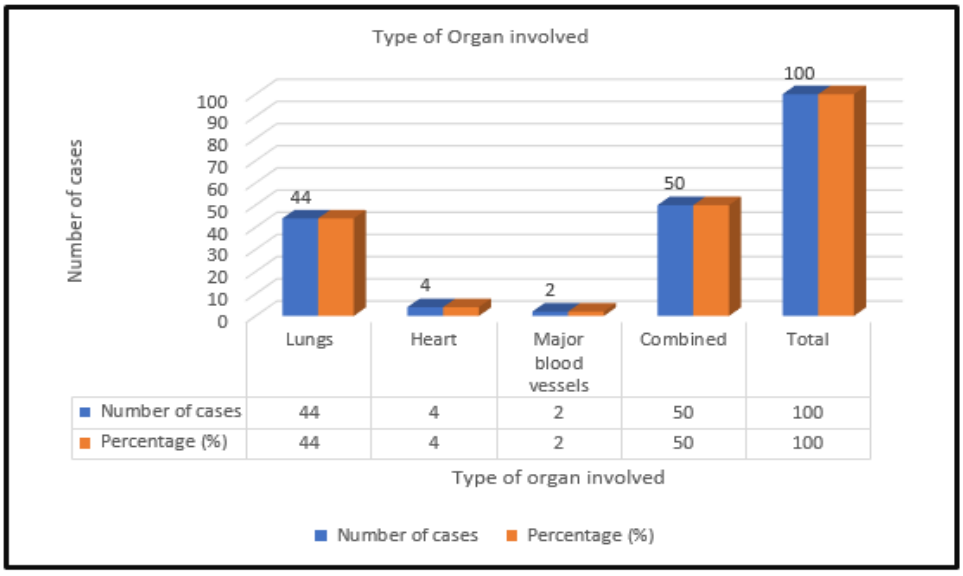

Fig 4 Organs involved in the accident

Table 5 and fig 4, shows vital organs involved in accidental cases viz: lungs, heart, major blood vessels, and combined vital organs. During accidents, lungs are highly involved, followed by the heart and major blood vessels. This also observed that all major organs were involved in 50% of cases. This reflects the impact of accidental instances leading to death due to multiple organ involvement.

Table 6: Mode of death due to fatal chest injuries

Sr no	Mode of Death	Number of cases	Percentage (%)
1.	Asphyxia	0	0
2.	Shock and Haemorrhage	92	92
3.	Coma	6	6

4.	Septic shock	2	2
5.	Combined	0	0
	Total	100	100

Table 6 illustrate the death due to fatal chest injuries and their different mode of death. The maximum death cases were found to be due to the Shock and haemorrhage.

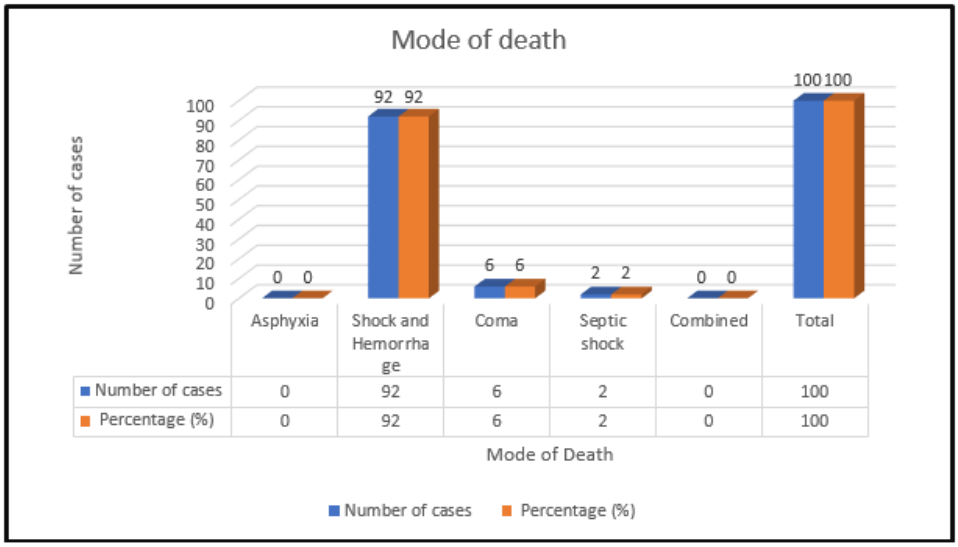

Fig 5: Mode of Death

Table 6 and fig 5 shows 92 cases (92%) of sShock and haemorrhage and, 06 patients (6%) of coma.

Table 7: Percentage of cases with Age, Type of road user, Bony structures, pleural cavity, type of organ and mode of death.

Age	Percentage (%) of Age	Type of road users	Percentages of Type of road users	Bony structure	Percentage of Bony structure	Pleural Cavity	Percentage of Pleural Cavity	Type of Organ	Percentage of Type of Organ	Mode of Death	Percentage
0-10	3	Pedestrian	20	Rib	48	Normal	44	Lungs	44	Asphyxia	0
11--12	5	Two wheeler Rider	62	Clavicle	4	Haemothorax	56	Heart	4	Shock and Haemorrhage	92
21-30	42	Two wheeler pillion	6	Sternum	10	Pyothorax	0	Major blood vessels	2	Coma	6
31-40	24	Driver	2	Vertebrae	12	Pneumothorax	0	Combined	50	Septic shock	2
41-50	14	Passengers	10	Combined	26	Combined	0			Combined	0
51-60	8		0		0		0		0	-	0
>60	4		0		0		0		0		0
Total	100		100		100		100		100		100

It was observed from table 7 that the maximum number of chest injuries due to blunt trauma that occurred between 42 cases (42%) of the age group of 21 - 30 years, followed by 24 cases (24%) of the age group 31 - 40. In the study population in RTA, it was observed that 62 (62%) motorcyclists were the major victims of blunt chest injuries, followed by pedestrians in 20 cases (20%). We observed that victims had 48 cases (48%) of rib fractures, followed by combined bony fractures in 26 cases (26%). 44 cases (44%) had a normal pleural cavity, and 56 cases (56%) had hemothorax. The study shows that combinations of injury to more than one organ were more common in 50 cases (50%) and 44 cases injury due to lung. The result also showed that death was due to shock and hemorrhage in 92 patients (92%), followed by 06 cases (6%) due to coma

4. DISCUSSION

Chest injuries are seen very frequently in civil populations. The major reasons for blunt chest injuries are due to traffic accidents with an incidence of 70-80%

4.1 The Age Profile of the Victims

In the present study, out of 100 cases, the maximum cases (42%) of blunt chest injuries were detected in the age group of 21 – 30 years and 24% cases were of the age group of 31-40. after that in the age group of 31 - 40, 24 cases (24%). Similar finding was observed in the studies conducted by Raju S Iyer[15], A.L. Ghangale[16], R.V. Kachre[17], D. Harish[18], Harnam Singh[19], and Pathak Manoj Kumar[20], the main reason behind this young people was that they were main earners in their family and they always went outdoors during most of the day for work purpose, whereas elder people remains indoors.

4.2 The Pattern of Bony Injuries in Victims

In the present study, we observed 48 cases (48%) of rib fracture, and 26 cases of combined bony fractures in the study by other researchers like Robert M. Shorr[2], Raju S Iyer[15], A.L. Ghangale[16], Dr T.H. Meera[21], Pathak Manoj[20] and Martins Oluwafemi Thomas[22].This could be because the chest area is highly exposed to injuries as it is spread over a large surface area.

4.3 Condition of The Pleural Cavity in Fetal Chest Injuries

In this study, it was observed that there were 44 cases (44%) had a normal pleural cavity and 56 patients (56%) had hemothorax which in consistent with studies done by Serife Tuba Liman[23], N. Ali[24], Dr Harnam Singh[19] and Pathak Manoj Kumar[20]. Pleura are closely attached to lungs so spared in case of minor trauma, but fracture ribs and injury to lung parenchyma can cause haemothorax.

4.4 The Pattern of Visceral Injuries in Victims

In the present study, it was detected that injury involving more than one organ in 50 cases (50%) followed by injury to the lung in 44 cases (44 %). This could be due to mobility of lung and heart in the chest cavity which could under acceleration and deceleration impact as previously reported by Zarza[25] Hamam Singh[19] and Pathak Manoj[20].

4.5 Mode of Death in Fatal Chest Injuries

The current study indicated that the death was due to shock and haemorrhage in 92 cases (92%) followed by death due to coma in 06 cases (6%), 45 patients (92%) of RTA died due to Shock and haemorrhage. This is in accordance with A.L. Ghangale16 and Harnam Singh[19] studies, but it contrasts with the study done by Meera Th[26]. This could be because we have selected only blunt chest injury cases and other than chest injuries excluded from our study.

5. CONCLUSION

Road traffic injuries and deaths are a major public health issue worldwide. Unless appropriate action is taken urgently, the problem will worsen globally. This will particularly be the case in developing countries where rapid motorization is likely to occur over the next two decades. The study concluded that trauma is one of the leading causes of death in the younger age group mainly in two-wheeler riders (62%). A scientific, systems approach to the problem of road safety is essential to minimize or control such injuries.

6. AUTHORS CONTRIBUTION STATEMENT

Dr Sanjeev M Katte, Dr Ashokkumar Rajaput, Dr Faisal Nasim Gilani, Dr.Milind Nisargandha, Dr.Shweta Parwe were involved in planning work, Dr Sanjeev M Katte, Dr Ashokkumar Rajaput, Dr Faisal Nasim Gilani contributed to the design and implementation processed collecting data, Dr Milind Nisargandha, Dr.Shweta Parwe drafted the manuscript and designed the figures and analysis, All authors discussed the result and commented on the manuscript.

7. CONFLICT OF INTEREST

Conflict of interest declared none.

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