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## The Spectrum of Lower Limb Injuries in Road Traffic Accidents Presenting at A Tertiary Care Hospital

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### Abstract

**Background:** Road traffic accidents are one of the major hazards of modern existence. The proliferation of motor vehicles and the rapid explosion of the population have increased the incidence of traffic accident injuries in most modern countries. A large part of the injuries in such cases is confined to the lower limbs.

**Methods:** The present study was carried out in patients admitted to a tertiary care hospital with road traffic accidents involving the lower limbs over a period of six months. The age distribution and range of injuries in this population were studied and analyzed. **Result:** The study showed that traffic injuries occur with greater frequency in young age groups (20 – 40 years) and in males, with a second surge of cases in persons over 50 years of age. The injuries range from soft tissue injuries consisting of minor cuts and bruises to bony injuries.

**Conclusion:** The commonest skeletal injuries occur in the leg with fractures of the tibia and fibula, followed by injuries to the foot. Knowledge of the age range and spectrum of injuries will help hospital administrators and trauma care specialists to be better equipped to manage traffic accident injuries.

**Keywords:** Road traffic accident, lower limb, soft tissue injury, fracture

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### Introduction

The lower limbs of human beings are primarily adapted for balance and locomotion,<sup>1</sup> just as the upper limbs' primary function is access to the apertures of the body and manipulation of tools. The erect posture assumed by man is inherently unstable and depends for its success on a carefully orchestrated balance between opposing groups of muscles, controlled by a rapidly adapting nervous system.<sup>1</sup> Damage to one or the other of the two lower limbs severely incapacitates an individual, whereas quadrupeds can maintain a reasonable amount of stability on three limbs out of four. The increasing population and crowding and congestion of both people and vehicles on the roads have led to an ever increasing number of road traffic

accidents.<sup>2</sup> This is due to ignorance and violation of traffic rules, decreased percentage of road networks, ever-increasing number of vehicles which are able to accelerate instantly and move fast with little regard for pedestrians. The tendency of individuals to cross the roads at will without caution has further compounded the situation.<sup>3,4</sup> The average height of vehicles with their fenders and bumpers cause the majority of traffic accidents injuries to affect the lower limbs.<sup>5</sup> The injuries range from minor abrasions, cuts, and bruises to serious injuries like compound and comminuted fractures, dislocations and crush injuries.<sup>6</sup> These are frequently accompanied by injuries to the trunk and the head. In the present study, we have analyzed the pattern of injuries to the lower limbs in traffic accident cases over a period of six months and looked for the most vulnerable

age groups and also the distribution of injuries in different regions of the lower limb.

## Materials and Methods

The present study was undertaken in the department of orthopedic surgery and the department of anatomy of, Prathima Institute of Medical Sciences, Nagunur, Karimnagar, Telangana, India. All road traffic accident injury cases admitted to the departments of surgery and orthopedics either through the general emergency or the outpatient department were considered for the study. The presenting injuries, as well as the management of these cases, were studied and analyzed for common injury patterns over a six month period from 01.01 2018 to 30.06.2018. Cases with preexisting diseases and injuries were noted. Routine biochemical tests were carried out with the help of the department of biochemistry to assess predisposing morbid conditions. As both emergency treatment and inpatient treatment is mostly free of charge, patients did not have to bear any additional burden by participating in the study. All cases included in the study were analyzed according to age and sex distribution in an attempt to determine the most vulnerable age groups for road traffic accidents. This will enable the authorities responsible for road safety to target their safety advice and precautionary notices to the people who are in greatest need. The spectrum of injuries revealed by the present study has been analyzed with respect to the depth and severity of the injury as well as the regions affected. This study will enable hospital authorities and trauma care specialties to anticipate the pattern of injuries and allocate resources and specialist resource persons accordingly.

## Results

In the present study, a total of 746 patients were admitted to the wards of the Departments of Orthopedics and general surgery with lower limb injuries due to road traffic accidents in the six months period under study. The range of patient ages varied from 9 years to 84 years. The greatest number of cases was in the age group of 21 to 40 years with a secondary rise in

the age group of 51 to 60 years (Table 01 & Fig. 01).

Injuries sustained by the patients were of various types. Soft tissue injuries consisted of both superficial and deep. Superficial injuries consisted of blunt compression, abrasions, and bruises, while deep injuries consisted of cut injuries, lacerations, injuries to deep fascia and muscles. These injuries were accompanied by a variable amount of blood loss. Bony injuries consisted of different types of fractures and dislocations of lower limb bones with their associated complications. They range from bony cracks and avulsions to simple metacarpal fractures (Fig. 03) to double fractures of the bones of the leg (Fig. 04). The distribution of these injuries is shown in Table 02 and Fig. 02.

**Table 1: Age and sex distribution of patients**

Age	No of cases		
	Male	Female	Total
1 - 10	14	04	18
11- 20	66	25	91
21 – 30	158	37	195
31 – 40	147	29	176
41 – 50	55	19	74
51 – 60	97	27	124
61 – 70	34	07	41
71 - 80	16	02	18
81 - 90	09	00	09
<b>Total</b>	<b>596</b>	<b>150</b>	<b>746</b>

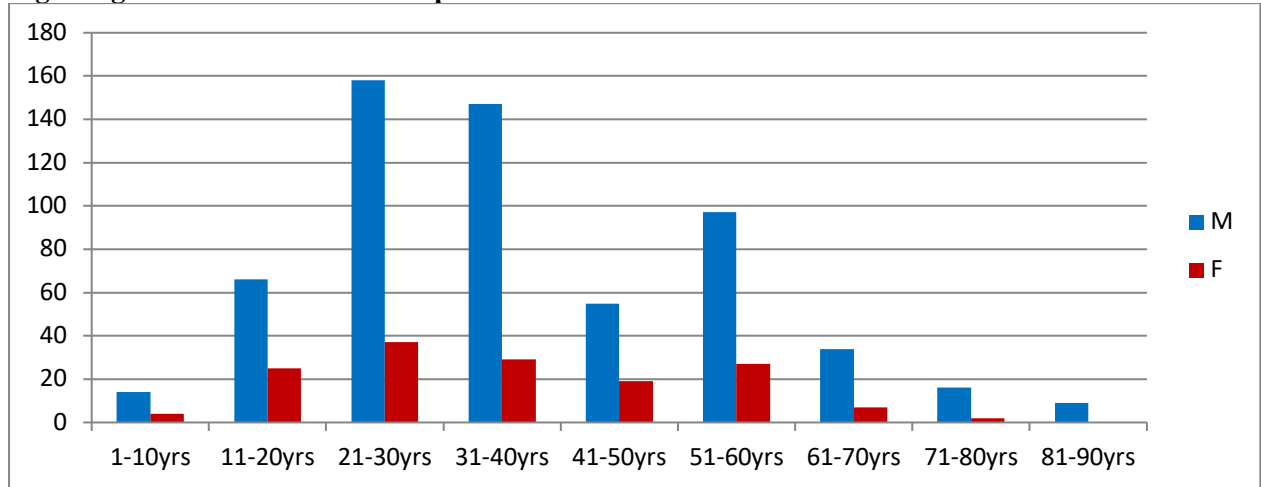
**Table 2: Pattern of injuries**

Soft tissue injuries to lower limbs	No. of cases
<b>Superficial injuries</b>	456
<b>Deep injuries</b>	290
<b>Total</b>	746

**Table 3: Pattern of injuries**

Bony injuries – fractures and dislocations, joint injuries	No. of cases
The femur (hip & thigh)	83
Tibia, fibula (Knee & Leg)	157
Ankle & foot	147
<b>Total</b>	387

**Fig 1: Age and sex distribution of patients**



**Fig. 03:** Radiograph showing fracture of Tibia and Fibula



**Fig 04:** Radiograph showing fracture of the 5th metatarsal



## Discussion

Hospitals located along major highways that too in populated towns near major intersections have to bear the brunt of road traffic accident cases. The problems are manifold - the victims are often travelers with no accompanying persons, they may be unable to pay for their treatments, locating their kith and kin is a difficult task and taking consent for desperate and hazardous procedures is often impossible. Added to these are numerous medico-legal issues, police, and mediclaim and reimbursement problems.<sup>7</sup> The victims may be broadly divided into two categories - the occupants of motor vehicles and pedestrians. Vehicles involved in traffic accidents may range from buses and trucks to cars and two-

wheelers. Apart from pedestrians on the foot, bicycle riders are frequently involved in accidents, particularly because they don't feel obliged to obey traffic laws. In the present study, a total of 746 patients were admitted to the general surgery and orthopedic surgery wards with lower limb injuries over a period of six months as considered in the study. The presenting injuries ranged from superficial injuries like abrasions, sharp injuries and lacerations superficial to the deep fascia to deep injuries to soft tissues beneath the deep fascia, including muscle, ligament, nerve and blood vessel injuries.<sup>8</sup> The age distribution of road traffic accident victims (Table. 01 and Fig. 01) shows that the most vulnerable age group is 21 to 40 years.<sup>9</sup> This group consists of the majority of the working and wage earning mass

of any population. These are the people who are compelled to travel frequently on a daily basis for their livelihood on which their families are dependent. Therefore these are the same people who constitute the major bulk of people on the roads and are naturally exposed to accidents. Health authorities, therefore, have to keep in mind the resources and manpower required to deliver proper emergency services to this backbone of society.

The second surge of road traffic accidents occurs in the age group of 51 to 60 years.<sup>10</sup> These constitute the people who are gradually moving upwards from middle age. This age group also shows the early effects of locomotor and other medical problems on a large scale.

Children below 10 years and the elderly beyond 70 years constitute a much smaller proportion of road traffic accident victims as they are protected by society and seldom venture out on open roadways.<sup>11</sup> In the present study, it is also seen that the majority of accidents occur in males. Females are comparatively seldom affected, probably because in our society they venture outdoors for livelihood in lesser numbers and are also much more cautious in their behavior on the streets.

An analysis of the injury pattern shows us that the majority of cases have soft tissue injuries with or without bony injuries.<sup>12</sup> This requires an efficient first aid delivery system for treatment of minor cuts and bruises and tetanus prophylaxis. A considerable number of cases had deep wounds requiring minor surgery including stitching and dressing, if necessary under sedation. In all hospitals, therefore, emergency wound management becomes an essential service. In the present study, about half of the total number of cases had bony injuries. The most common of these injuries were to the leg and foot. The leg is the body part commonly struck by moving vehicles resulting in different types of fractures to the tibia, fibula or both the bones.<sup>13</sup> These fractures require rapid response surgery as they are often compound or comminuted and are associated with injuries to the knee and ankle joint. Many of these cases require internal fixation with nails, plates, and screws as part of major orthopedic surgery. The ankles are a common site of run over and crush injuries with fractures of the metatarsal bones and crush injuries of the toes.<sup>14</sup> These cases

usually need first aid and plaster of Paris cast on an emergency basis. A comparatively lesser number of cases presented with fractures of the femur which are often serious and life-threatening with massive bleeding, shock and sometimes associated with pelvic injuries. These cases need specialty treatment in dedicated trauma care centers which are not always readily available.

## Conclusion

Our institution is situated close to the highway which witnesses high road traffic accidents, the present study carried out on road traffic accident victims over a six month period shows that the young people of the age group 20 – 40 years are the most vulnerable to RTA. These patients must be provided for in terms of emergency wound management and facilities of basic orthopedic surgery including fracture reduction and immobilization. A second age group of 50 – 60 years should be similarly treated along with their associated medical problems. The most common site of injuries is the leg with fractures of the tibia and fibula and the foot with fractures and crush injuries. Major fractures of the thigh though less common are far more serious. This analysis should enable healthcare providers and hospital management authorities to maintain suitable facilities for the management of such patients, especially those institutions situated near major road networks and highways.

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**Ethical Permission:** Obtained

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