



A PROSPECTIVE STUDY OF PATTERNS OF FOOT INJURIES FOLLOWING MOTORIZED TWO WHEELER TRAUMA

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ABSTRACT

Background:- Study designed to evaluate the incidence, prevalence, fracture patterns, associated injuries in a tertiary care centre in the Indian setup in motorised two wheeler trauma foot injuries.

Objectives:- To determine the prevalence and pattern of foot injuries following motorised two wheeler trauma.

Design :- prospective

Setting :- S.M.S medical college, Jaipur traumatology and orthopaedic centre

Material and method:- Patient who admit at department of orthopaedics and accidental emergency S.M.S. hospital jaipur with foot injury due to motorised two wheeler trauma either close or open foot injuries, any sex, any age between December 2017 to November 2018.

Results :- In our study 190 patients admitted in which 158 males and 32 females with Mean age 32.65 years. in them 86.3% driver and 13.7% rear seat passenger. Right foot (114 patients) involve more common than left foot. The motorcycle injuries included mostly metatarsal fracture (76 patients) and talus fracture (36 patients) with other fracture less common. Mostly fracture are open (79.5%). Associated injuries included lower limb (ankle 33.9%, tibia fracture 25.6%, femur 10.9%), upper limb injuries (25.6%), pelvic fracture 5.7%, head injury 12.8%, chest injury 1.3%.

Conclusion:- motorcycle accidents continue to be source of severe injury, especially the foot. The most common foot injury is metatarsal fracture in foot, however there must high index of suspicion for associated injuries. Majority of them are open foot injuries in young adult males (18-45 years).

KEYWORDS : motorised two wheeler trauma, foot injury, incidence, patterns, associated injuries

INTRODUCTION:-

There are the high numbers of pedestrians, two wheelers, and rickshaws on the Indian roads and their poor compliance to road safety rules and laws. These are called "vulnerable road users," and unfortunately WHO data clearly show that a third of the fatalities in India involve this segment of the accident victims.¹ Ankle and foot fractures are among the most common injuries treated by orthopaedic surgeons²⁻⁵. Despite being the principal weight bearing organ of the body, the amount of attention which the foot receives from the average Orthopedic surgeon is often negligible. This is often accentuated in trauma situations, when a surgeon has to deal with polytrauma or life/limb-threatening situations, and foot injuries are often accorded a low priority. In modern times when the mortality after trauma has been significantly reduced, many such patients recover and go back into the mainstream of life. Inadequately treated foot injuries significantly affect the overall outcomes in these patients. This is well documented in international studies that foot fractures are the most commonly missed extremity fractures in polytrauma patients⁶ and many times their treatment is delayed or neglected. Knowledge of the magnitude, duration, mechanism, and location of trauma is imperative to permit efficient and accurate assessment of foot and ankle injury, as well as other associated injuries. The residual sequelae of ankle and foot fractures especially with sub-optimal treatment have a considerable socio-economic bearing as the most commonly affected cases are in the most productive age group (i.e. 21 to 45 yrs)⁷. Studies addressing the epidemiology of foot injuries, have investigated specific types of foot injuries^{8,9}, foot injuries related to a single mechanism of trauma¹⁰⁻¹², or foot injuries in specific populations¹³⁻¹⁵. Taking into consideration all these facts, this study was designed to evaluate the incidence, prevalence, fracture patterns of foot injury in motorised two wheeler trauma and associated injuries in a tertiary care centre in the Indian setup.

Observation and Discussion

We analysed the results of overall motorised two wheeler foot

trauma patients as one unit of cases 190 from December 2017 to November 2018.

1. Gender Distribution:- In our study out of total sample size of 190, number of male patients were 158 (83.2%) and number of female patients were 32 (16.8%). In this study male to female ratio is 4.93: 1. Male to female ratio in the study of Dhillon M S et al¹⁶ was 4.58:1 in the Indian scenario in tertiary level centre. G. K. Sharma et al¹⁷ found male to female ratio 4.76:1.
2. Age distribution:- In our study mean age of male patients was 33.01±13.04 years and mean age of female patients was 30.84±13.04 years. Overall mean age of patients was 32.65±13.03 years. Maximum patients were of age group of 26-35 years and followed by 18-25 years. Dhillon M S et al¹⁶ studied found average age of foot trauma patients admitted in tertiary centre was 30.81 years. G.K. Sharma et al¹⁷ studied 294 foot and ankle trauma patients. The most affected were young adults between 18 to 45 years (65.3%).
3. Accident of vehicle causing accident:- There were 78.9% motorised two wheeler trauma by motorcycle as compared to scooty 21.1%. Motorcycle trauma occur mostly in young male age group (144 male patients) however scooty two wheeler trauma was mostly present in young female age group (26 female patients).
4. Side of foot injury:- In our study we found that right side foot injury was present in 114 patients (60.0%), left side foot injury was present in 62 patients (32.6%) and bilateral foot involvement was found in 14 patients (7.4%). Dhillon M S et al¹⁶ found in his study that in 145 feet injury there was 44 (32.84%) left foot, 79 (58.96%) right and 11 (8.21%) bilateral. Imke Höfling et al¹⁸ found in their study that the left leg was injured more often than the right side whereas no difference regarding the side of injury was noted for injuries of the upper extremity in motorcycle trauma. In Indian scenario left lane traffic present so, right foot or leg injuries far common than left side.
5. Foot region injury distribution:- In our study anatomical region

- of foot injuries were like forefoot injuries occurred in 107 patients (56.3%), mid foot injuries in 15 patients (7.9%) and hind foot injuries in 46 patients (24.2%). There were many patients which had more than one anatomical region injury. Five patients (2.6%) had forefoot with mid foot injuries, 14 patients (7.4%) had forefoot with hind foot injuries and 3 patients (1.6%) had mid foot with hind foot injuries. So, in our study mostly forefoot injury occur in motorised two wheeler trauma. Dhillon M S et al¹⁶ found in 134 foot injury patients there were 177 injuries of different regions of foot, 60 were hind foot injuries, 23 mid foot injuries and 94 forefoot injuries. These injuries included 11 cases (8.21%) with multiple injuries involving different three regions of foot. In R. F. Jeffers et al¹⁹ study the motorcyclists injuries included 26 metatarsal fractures (49.1%), 14 Talar fractures (26.4%), 7 oscarlis fractures (13.2%), and 6 toe fractures (11.3%) showing forefoot injuries were more common in foot injuries due to motorised two wheeler trauma.
6. Type of injury:- In our study motorised two wheeler foot injuries had open foot injuries in 151 patients (79.5%), closed foot injuries in 33 patients (17.4%) and one side open with another side closed foot injuries in 6 patients (3.1%). Dhillon M S et al¹⁶ study showed that ninety-seven (72.39%) patients had open fractures, 31 (23.13%) patients had closed fractures and there were six (4.48%) patients with bilateral foot injury who had one side open and one side closed injury. G. K. Sharma et al¹⁷ study showed that 69.1% patients involved in RTA had open fractures. Kortor JN et al²⁰ studied on 429 motorcycle accidents lower limb injuries represented the commonest type of injury (238, 55.5%) and closed fractures were more common than the open fractures.
 7. Specific foot injury:- In our study forefoot injury [phalanges fracture in 17 patients, metatarsal fractures in 76 patients, combined metatarsal with phalanges fracture in 14 patients], mid foot injuries {chopart fracture in two patients, lisfranc fracture in eight patients, navicular cuboid and cuneiform fracture in three patients, navicular with lisfranc fracture in one patient} and hind foot injuries (calcaneum fracture in nine patients, talus fracture in 36 patients, heel pad avulsion in one patient) found. There was many associated foot injuries present either segmental or bilateral side which were metatarsal with calcaneum fracture in six patients, metatarsal with heel pad avulsion in three patients, metatarsal with talus fracture in five patients, metatarsal with lisfranc fracture in three patients, metatarsal with navicular fracture in two patients, calcaneum with lisfranc fracture in three patients. So, in our study showed that metatarsal fractures were common in overall motorised two wheeler foot injuries. Specifically metatarsal fractures were common in forefoot injury, lisfranc fractures in mid foot injury and talus fracture in hind foot injury. Dhillon M S et al¹⁶ study showed that specific diagnostic labeling revealed 45 calcaneal injuries, eight talar injuries, three subtalar joint fracture dislocations and four heel pad avulsions in the hind foot. In the mid foot there were 12 lisfranc injuries, five Chopart's dislocations, three navicular injuries, one cuboid fracture and two medial cuneiform injuries. Forefoot injuries were the commonest, with 66 cases of metatarsals injuries, 20 phalangeal injuries and eight combined metatarsal and phalangeal injuries. But in this study all foot trauma patients were analysed. R. F. Jeffers et al¹⁹ showed specific pattern in the motorcyclists injuries included 26 metatarsal fractures (49.1%), 14 talar fractures (26.4%), 7 oscarlis fractures (13.2%), and 6 toe fractures (11.3%). Richter M et al²¹ studied 155 patients with mid foot fracture in them cause of injuries were traffic accidents (72.2%). Mid foot fractures (I) were found in 55 (35.5%) cases, Lisfranc fracture dislocations (L) in 49 (31.2%), Chopart-Lisfranc fracture dislocations (CL) in 26 (16.8%) and Chopart fracture dislocations (C) in 25 (16%) showing lisfranc injuries were common in road traffic accident in mid foot injuries.
 8. Severity of injury :- In our study out of 190 foot injury patients 146 patients (76.8%) had simple foot injury and 44 patients (23.2%) had severe foot injury. So, simple to severe foot injury ratio was 3.31. Dhillon M S et al¹⁶ studied that fifty-six out of 134 patients (41.79%) were classified as severe foot injuries; further evaluation revealed bilateral foot involvement in three of these cases, combined bilateral and segmental foot involvement in two cases, and segmental foot involvement in 12 cases. Moderate soft tissue injury was noted in three segmental foot injuries, while 23 cases had significant soft tissue loss, with associated crushing/ traumatic foot amputation in 13 cases. Seventy-eight cases had simple foot injuries. Tadros AM et al²² studied the epidemiology of foot injuries in 171 patients, 70 (41%) had severe injuries while 101 (59%) had simple ones.
 9. Distribution of severe foot injuries :- In our study 49 severe foot injury patients in which 12 patients had bilateral foot injury, 20 patients had segmental foot injury and 17 patients had crushed foot which at the end resulted in to amputation. Dhillon M S et al¹⁶ study showed 43 severe foot injury in which five patients had bilateral foot injury, 15 patients had segmental injury and 23 patients had crush foot or amputation.
 10. Driver / rear seat passenger:- In our study 164 patients (86.3%) are driver (24 female ,140 male) and 26 patients (13.7%) are rear seat passenger (18 male, 8 female). In Indian Scenario two wheeler are one of main vehicle for short distance travelling in medium class people. In study of Howley et al²³, 58.2% of patients were injured while riding a motorcycle or scooter, 22.5% were pedestrians, and 9.2% used motorized rickshaws. Male victims were younger than female victims and were overrepresented among motorized 2-wheeler users. Jeffers RF et al¹⁹ studied in 53 foot injured motorcyclists fifty-two were drivers and one was a rear-seat passenger. Zarquar M et al²⁴, studied motorcycle-related injuries,1332 were motorcyclists. Of these,1226 (92.04%) patients were driving the motorcycle at the time of the accident and 75 (5.6%) were pillion passengers.
 11. Month wise distribution:- In our study mostly two wheeler foot injury patients admitted in February (30 patients) followed by august (22 patients). Ruikar M et al²⁵, showed in the month-wise distribution of road accidents and it has also shown more accidents during the month of May (8.8%) followed by the month of April (8.74%) and January (8.72%), while the least number of road accidents were reported in the month of September. Pouraghaei M et al²⁶, found that most of the patients were referred in summer (33.6%) in June month (11.6%).
 12. Type of associated injury:- In our study 34 patients had isolated foot injuries and 156 patients had associated injuries [40 patients (25.6%) had upper limb injuries, 53 (33.9%) patients had ankle fracture, 40 (25.6%) patients had tibia fracture, 17 (10.9%) patients had femur fracture, 9 (5.7%) patients had pelvic ring fracture, 20 (12.8%) patients had head injury and 2 (1.3%) patients had chest injuries] . So, mostly motorised two wheeler foot injury patients were associated with other body injury. Most common associated injuries were lower limb injuries especially ankle fracture followed by tibial fracture. Patients who had head injury does not wear helmet and in routine many of them had severe head injury. Mostly talus fracture were associated with ankle injury due to sudden ankle twisting force. In R. F. Jeffers et al¹⁹ study associated injuries included 22 ankle fractures (41.5%), of which six were fracture-dislocations and five were open injuries; 14 involved the medial malleolus, five involved the lateral malleolus, and three were bimalleolar. There were also 15 tibia fractures (28.3%), six femoral fractures (11.3%), 5 pelvic ring injuries (9.4%), 23 upper limb injuries (43.4%), and 3 cases of chest trauma (5.7%). In Kortor JN et al study²⁰ showed that lower limb injuries (73.4%) were common in motorcycle trauma than any other injuries. Madhuvardhana T et al²⁷, showed two wheelers were the most common vehicles involving in accidents (41.3%).

SUMMARY AND CONCLUSIONS

As we concluded our study "A PROSPECTIVE STUDY OF PATTERNS OF FOOT INJURIES FOLLOWING MOTORIZED TWO WHEELER TRAUMA" we found males (83.2%) were more common than females in motorised two wheeler accidental foot injuries. The mean age among the male patients was 33.01±13.04 years and mean age of female patients was 30.84±13.04 years and mean age of all patients

was 32.65±13.03 years. Out of total 190 patients most of the 139 patients were 18-45 year age group. Around one-third patients were below 25 year age group. Mostly male patients were involved in accident occurred by driving motorcycle and female patients were involved in accident by scooty. Right side (60%) feet injury were far common than left feet (32.6%) injury. Forefoot injuries in motorised two wheeler trauma were more common followed by hind foot and mid foot. Open type (79.5%) feet injuries are more common than closed feet injuries. Most feet injuries were isolated metatarsal fracture (40%) followed by talus (18.9%) fracture. There were many metatarsal fracture associated with other foot injuries. Simple feet injuries (76.8%) were higher than severe feet injuries. Mostly severe foot injuries were segmental foot injuries (45.4%) followed by crushed foot. Mostly feet injuries occurred in driver seat passengers (86.3%). Mostly two wheeler feet injuries occurred in February followed by August. In motorised two wheeler foot trauma most common associated injuries were lower limb injuries. Out of them ankle injuries (33.9%) followed by tibial fracture (25.6%) were common in lower limb associated injuries. Mostly associated head injuries were found in patients which were not wearing helmet.

In our study we found that foot injury in two wheeler trauma occurred at younger age, which can be reduced by proper road traffic education. Right side foot involvement was common in left lane Indian traffic. So, there is need to be focused on its precautions and safety. With the increasing age the chance of foot injury in motorised two wheeler trauma was reduced because of increased experience of driving. Foot injuries were associated with many severe fatal injuries which can lead to long term morbidity and mortality. So, it can be reduced by proper traffic rules education, speed limit and using safety precautions.

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