

# Analysis of the Prevalence of Fractures Caused by Bicycle Accidents

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## ABSTRACT

**Objective:** The purpose of this study is to examine the epidemiological features of fractures that are received in bike accidents.

**Study design:** Retrospective study

**Place and duration of study:** Department of Orthopedic, Mardan Medical Complex, Mardan for the period of one year from January 2021 to January 2022.

**Methods:** There were 210 patients of bike accidents were analysed through severity scoring system. Various bike types, fractures sustained, rate of mortality, helmet usage was analyzed. Detailed demographics of enrolled cases included age, sex, BMI and localities were recorded after taking informed written consent. Outcomes were assessed in terms of fractures sustained during accidents. We used SPSS-21.0 to analyze our data.

**Results:** There were 54.8% males and 45.2% females. The mean age of the patients was 31.8±6.17 years. We found that 192 (91.4%) patients wear no helmet. The presentation of the injuries showed that majority of the cases 100 (47.6%) had lower limb injuries. The majority of patients with multiple injuries also suffered from upper limb, facial, spinal and chest trauma. Overall mortality rate was 22 (10.5%).

**Conclusion:** We concluded in this study that wearing helmets can reduce the severe life threatening injuries caused by bike accidents.

**Keywords:** bike accidents, fractures. Mortality, multiple injuries

## INTRODUCTION

Those under the age of 20 rely heavily on bicycles and motorbikes for both daily transportation and recreational purposes. Injuries are common when people ride bicycles or other two-wheeled vehicles. Young adults under the age of 20 experience injury at a higher rate than any other age group [1]. Injuries sustained in automobile collisions rank among these top ten reasons for visits to hospital emergency rooms [2]. Car accidents, for example, don't have the same features that are seen in bicycle and motorcycle collisions. When involved in a motorcycle or bicycle accident, the body is more vulnerable to the elements than in a car crash. Bicycles and motorbikes are unstable due to their two-wheeled design. Moreover, the road surface and surrounding environment also contribute to a significant accident risk for them. Deathly injuries, including to the head and limbs, may follow [3-5].

Cycling is deeply ingrained in Dutch society, and one million bicycles are purchased year [6]. More people in The Netherlands use bicycles as a primary form of transportation, but the country also has a greater rate of serious bicycle accident injuries [7]. It's estimated that accidents involving bicycles cost the Dutch economy 402 million euros annually [8].

There have been a number of population-based studies on bicycle-related injuries, but far less on those injuries seen by emergency departments. Better emergency treatment and the ability to adopt efficient injury prevention initiatives are both made possible by a deeper comprehension of the epidemiology of this population.

Motorcycle helmets have a well-established protective effect [9], but head injury is nevertheless seen as a major cause of death for motorcyclists in accidents. Similarly, the most common bicycle-related accident requiring medical attention is a head injury [10]. In terms of public health, the yearly cost of caring for bicycle collision victims in the United States is estimated to be over \$8 billion [11]. In spite of the serious implications of head injuries sustained in motorcycle and bicycle traffic accidents [12], the wearing of helmets is now only required for motorcyclists in Taiwan. That's why you see more motorcyclists and less cyclists without helmets. The typical bicycle helmet is smaller, thinner, and lighter than a motorcycle helmet, therefore it may offer less protection in an accident. On top of that, the impact energy may vary between motorcycle and bicycle crashes due to the disparity in riding speeds. Taiwan has a high rate of motorcycle and bicycle

accidents on its packed streets, however data on the preventive benefit of helmet use is limited [13].

The prevalence of bicycle-related injuries has been the subject of a great deal of research. Further research is needed to ascertain the exact number and incidence rate so that a strategic strategy can be developed to reduce injuries[14,15]. In order to better understand the prevalence and epidemiology of bicycle-related injuries and accidents, as well as to identify characteristics and trauma patterns that might be used to predict their outcomes, the present study was designed.

## MATERIALS AND METHODS

This retrospective study was conducted in the department of Orthopedic, Mardan Medical Complex, Mardan for the period one year from January 2021 to January 2022. It comprised of 210 patients. Detailed demographics of enrolled cases included age, sex, BMI and localities were recorded after taking informed written consent. Patients <15 years of age, pregnant females, patients had cardiac failures and those did not provide any written consent were excluded in this study.

Included patients were aged between 15 to 55years. If the trauma was unilateral or bilateral and whether there were fractures, hematomas, or internal bleeding were all factors considered. This was accomplished by modifying an injury severity score. In this example, injuries were classified as minor to multi-trauma, with the threshold for the latter set at a score of larger than 15 for the 98 classification system's abbreviated-injury severity scoring system and greater than 12 for the 08 classification system's scoring system. In addition, the proforma noted whether or not the patient was wearing a helmet. Mortality rate statistics were compiled. This procedure was written after being given the green light by an ethical review board. In addition, each patient's caregivers were contacted by phone for informed permission prior to the study, and they were assured that the information gleaned from their loved one's medical records would be utilized solely for research and not in any way that would compromise their privacy. Mortality rate and secondary outcomes such differences in accident severity on racing bikes, off-road bikes, or e-bikes were used as indicators of success. Chi square test was used for statistical analysis, and numerical data was summarized using means and standard deviations. The SPSS-21 programme was used to input and evaluate the data. This was checked using the t-test. To be statistically significant, the p-value has to be less than 0.05.

**RESULTS**

There were 54.8% males and 45.2% females those were sitting behind males on motorbikes. The mean age of the patients was 31.8±6.17 years. Mobile usage, smoking and racing/one wheeling were the most cause of accidents among all cases.(table-1)

Table-1: Information of the admitted patients

Variables	Frequency	Percentage
Mean age (years)	31.8±6.17	
Gender		
Male	115	54.8
Female	95	45.2
Cause of Accidents		
Mobile Usage	70	33.3
Smoking	30	14.3
Racing -Wheeling	110	52.4

Among all cases, 192 (91.4%) patients wore no helmet and 18 (8.6%) patients wore helmet.(figure-1)

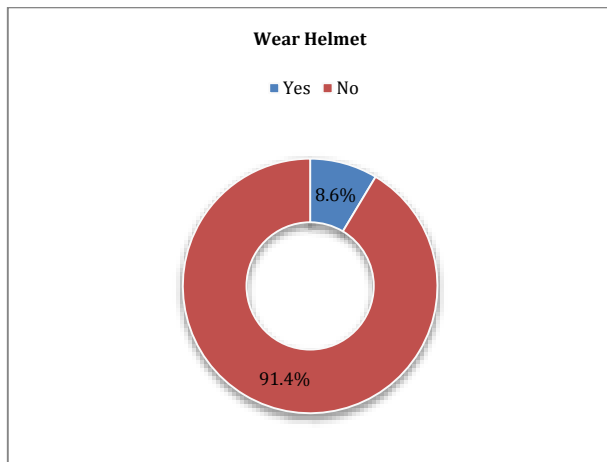


Figure-1: Frequency of helmet used among all cases

The presentation of the injuries showed that majority of the cases as 100 (47.6%) had lower limb injuries. The majority of patients with multiple injuries also suffered from upperlimb, facial, spinal and chest trauma.(figure-2)

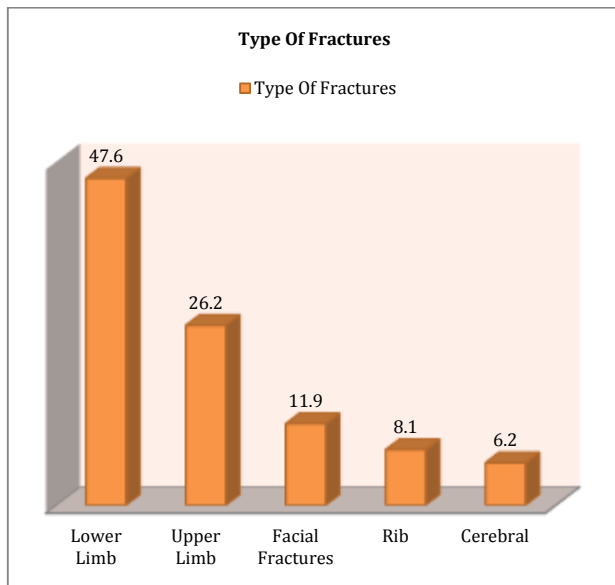


Figure-2: Association of injuries among all cases

Among 100 cases of lower limb, femoral, tibia and knee were most common while in 55 cases of upper limb, distal radius, proximal humerus and ulna were the most common fractures.(table-2)

Table-2: Types of upper and lower limb fractures

Fractures	Frequency	Percentage
Lower Limb		
femoral	54	54
tibia	30	30
knee	16	16
Upper Limb		
distal radius	24	43.6
proximal humerus	20	36.4
ulna	11	20

Overall mortality rate was 22 (10.5%) in which 19 patients were not wear helmets and 2 patients wear helmet.(table-3)

Table-3: Frequency of died cases

Variables	Frequency	Percentage
Mortality		
Yes	22	10.5
No	188	89.5
Wear Helmet		
Yes	19	9.05
No	2	1

**DISCUSSION**

Accidents that occur on the side of the road are a significant cause of injury and death around the globe. The number of individuals who ride public transit has increased dramatically over the past several decades, which has resulted in a sharp rise in the incidence rate of accidents. Cycling, in particular, presents a number of significant dangers compared to other modes of mobility. A significant number of individuals have been murdered and a far larger amount of people have been wounded while riding bicycles, which has led to a rise in the amount of people who need medical care for injuries linked to bicycles. Accidents caused by reckless and speeding driving, an excessive amount of individuals using the roads, an excessive population, bad road conditions, driver fatigue, and illegal immigration are the key contributors to the problem.[16]

In current study 210 patents were presented. There were 54.8% males and 45.2% females. The mean age of the patients was 31.8±6.17 years. Mobile usage, smoking and racing/one wheeling were the most cause of accidents among all cases. Findings of our research was comparable to the previous studies.[17,18] Both the fatality rate and the prevalence of multiple injuries were significantly high among hospitalized cyclist accident victims (5.7% and 41.0%, respectively). Four percent of the cyclists seen in the emergency room for traumatic lower limb, upper limb and head injuries in a Dutch research [19] died from their wounds while hospitalized. Our study may have identified a somewhat higher frequency since we included only patients who were admitted to the hospital ward following treatment in the emergency room, and hence our sample group may have been more severely damaged. Sixty-nine point five percent of patients in the current research presented with at least one fracture, whereas 11.9 percent and 18.09% suffered either pleural effusion and subarachnoid intracranial hemorrhage, respectively. The most prevalent types of injuries were to the head and chest. In our study, 100 (47.6%) cases had lower limb injuries. The majority of patients with multiple injuries also suffered from upperlimb, facial, spinal and chest trauma.

By increasing physical activity, Hartog et al. [20] found that bicycling had a positive effect on health that is 9 times greater than the negative effects of breathing in air pollution or dying in a car crash. Despite widespread belief that they can be avoided, bicycle accidents continue to play a major role in the tragic toll that traffic accidents take on innocent lives and bodies. As a result, more

robust injury prevention tactics are required, such as education to promote safety practices and raise knowledge of forthcoming new (typically faster) bicycle kinds. Second, The Netherlands may need to implement tighter traffic legislation in order to reverse the present downward trend in the number of traffic accidents. [20] In our study, overall mortality rate was 22 (10.5%) in which 19 patients were not wear helmets and 2 patients wear helmet.

Concerns have been raised over several aspects of the two-wheeled vehicles' lack of safety. Challenges in enhancing the safety of motorized 2 relate to the rider, to other people who use the road, and to the environment surrounding the route. In certain nations, getting rider clearance for even tried-and-true safety precautions like helmet use can be challenging.[21]

## CONCLUSION

We concluded in this study that wearing helmets can reduce the severe life threatening injuries caused by bike accidents.

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