

# Analysis of increased motorcycle accidents during the COVID-19 pandemic: a single-center study from Türkiye

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## ABSTRACT

**BACKGROUND:** The Coronavirus Disease 2019 (COVID-19) pandemic has led to a unique set of circumstances, straining health-care systems and affecting the way of life in societies around the world. Measures such as social isolation, travel restrictions, and workplace closures have led to an increase in motorcycle use. Consequently, motorcycle accidents have become a significant problem during this period. This study presents detailed research conducted to examine motorcycle accidents during the COVID-19 pandemic and to understand the causes and consequences of the increase in these accidents.

**METHODS:** This research evaluated records from a single health examination and used various models to analyze motorcycle accidents within a specified time period. Additionally, retrospective analyses were conducted to examine associations between motorcycle use and crashes in our country before and after the pandemic. The records of 386 patients who were injured in motorcycle accidents and followed up, received treatment, and were recorded at Biruni University Hospital between November 2015 and April 2023 were retrospectively examined. Noted details included the victims' age, gender, injury mechanism, injury site, injury severity, helmet use, presence and location of fractures, time distribution of the accident, and the severity of other important tissue injuries. The relationship between the injury site, fractures, and accident details, and the "Injury Severity Score" (ISS) was also investigated.

**RESULTS:** Among the 386 injured victims in motorcycle accidents, 333 were male and 53 were female. Of these, 168 (43.5%) were motorcycle drivers, 137 (35.5%) were motorcycle couriers, and 81 (21%) were pedestrians. A total of 186 (48%) injuries occurred before the pandemic (November 2015-March 2020), while 200 (52%) were sustained during the pandemic. The study indicates a noticeable increase in motorcycle injuries, particularly among motor couriers, especially during the pandemic quarantine periods. Post hoc analysis revealed that motor couriers had significantly lower ISS compared to other professions ( $p=0.009$  and  $p=0.045$ , respectively). Motorcyclists who wore helmets were found to have significantly lower ISS than those who did not wear helmets ( $p<0.05$ ). Furthermore, it was found that the ISS was positively correlated with the number of bone fractures, total soft tissue injury, and significant clinical characteristics ( $r=0.758$ ,  $r=0.756$ , and  $p<0.001$ , respectively).

**CONCLUSION:** This clinical study's findings demonstrate that the measures implemented during the pandemic to limit society's mobility have led to an increase in motorcycle accidents. Notably, there has been a significant rise in the number of accidents, particularly involving individual motorcycle use and motorcycle courier services.

**Keywords:** Accident; courier; COVID-19; motorcycle; pandemic.

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## INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic has posed one of the most significant threats to public health. The first case was reported in Wuhan, the capital of China's Hubei province, on November 17, 2019, and the World Health Organization (WHO) declared it a global pandemic on March 11, 2020.<sup>[1,2]</sup> The measures taken during this period were intended to limit community mobility. However, these measures increased motorcycle usage, leading to a rise in motorcycle accidents (ICD-10-CM Diagnosis codes are V02, V09.2, ICD-10-CM range: V20-V29: V28.0, V28.1, V28.3, V28.39, V28.4, V28.5, 28.09, V28.19, V28.2, V28.49, V28.59, V28.9, V29, V29.39, V29.8, V29.81, V29.88, V29.99, and also V80.5). As individual motorcycle usage has been growing daily, this pandemic has not only brought about a unique transformation in the world but has also led to an increase in commercial motorcycle usage.<sup>[3]</sup> Owing to quarantine and restrictions worldwide, the demand for motorcycle couriers in the service sector, particularly for product delivery, rapidly escalated. This surge has placed significant strain on the already busy courier sector. It is believed that, similar to individual motorcycle accidents, this situation has also led to a significant increase in motorcycle courier accidents.<sup>[4,5]</sup> In this clinical study, we conducted a detailed evaluation of motorcycle accidents, including those involving motor couriers, which increased during the COVID-19 pandemic compared to the period before, in light of the current literature.

## MATERIALS AND METHODS

The records of 386 patients who were injured in motorcycle accidents and subsequently followed up, received treatment, and were recorded at Biruni University Hospital between November 2015 and April 2023 were retrospectively examined. In these accidents, the individuals involved were categorized as 'motorbike courier,' 'individual motorcycle user,' and 'motorcycle accident victim pedestrian.' Our initial step involved reviewing national traffic accident data, hospital forensic records, and police reports.

For this study, we relied on the declarations of official authorities to delineate the pre-pandemic and pandemic stages. According to these sources, the first case of the novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) or COVID-19, reported by the Ministry of Health in Türkiye, was recorded on March 11, 2020.<sup>[6]</sup> The Ministry initiated the first restrictions against the pandemic, and the first lockdown began on March 22, 2020. On May 5, 2023, the WHO declared that the pandemic was no longer a global emergency.<sup>[7]</sup>

All existing cases were compared and examined in two main groups: pre-pandemic (22.11.2015–10.03.2020) and pandemic (11.03.2020–28.04.2023). The following patient data were documented: age, gender, mechanism of injury (lose of self-control (non-collision accident), collision with another ve-

hicle, crash into road structures, collision with pedestrians), injury region (head-neck, maxillofacial, thoracic, abdominal, upper extremity (including scapula/clavicle), lower extremity (including pelvis), dorsolumbar), Injury Severity Score (ISS: 0-75) (Minor trauma: ISS<9, Moderate: ISS=9–15, Severe: ISS=16–24, and Critical: ISS≥25),<sup>[8]</sup> helmet usage, presence and location of fractures (cranial, maxillofacial, cervical vertebrae, thoracic vertebrae and ribs, upper extremity, pelvis, and lower extremity), distribution of accidents over time (year, month, day, hour), and the severity of other important tissue injuries (ligament and meniscus injuries, tendon injuries, pneumothorax, lung contusion, liver/spleen injuries, cerebral contusion, traumatic subarachnoid/intracranial hemorrhage, diffuse axonal injury, brachial plexus injury, tetraplegia). The relationship between the injury site, fractures, and accident details, and the ISS value was also investigated.

The authors declared that the research was conducted in accordance with the principles of the World Medical Association Declaration of Helsinki, "Ethical Principles for Medical Research Involving Human Subjects." This clinical study's protocol was approved by the Ethics Committee of Biruni University (Permit number: 2023/83-27). Informed consent was obtained from the patients or their legal representatives.

### Statistical Analysis

The Chi-squared test and Fisher's exact test (when necessary) were used to analyze categorical variables. The normality of numeric variables was tested with the Shapiro-Wilk test. Mean differences between two groups with normally distributed data were compared using the Student's t-test, while the Mann-Whitney U test was applied for comparisons of data that were not normally distributed. The Spearman correlation coefficient was used to assess the relationships between numerical variables that did not demonstrate a normal distribution. Descriptive statistics for continuous data are presented as the median (Q1–Q3). All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, SPSS Inc., Chicago, IL, USA) version 21.0. p-values were obtained from the Chi-square test, and p-values less than 0.05 were considered statistically significant. Relationship analysis of categorical variables was conducted using Exact or Pearson Chi-square tests.

## RESULTS

When all existing cases were evaluated in two main groups: pre-pandemic (from 22.11.2015 to 10.03.2020) and pandemic (from 11.03.2020 to 28.04.2023), we observed that the average number of pre-pandemic cases (186 cases in 1,571 days) was relatively lower compared to the average number of pandemic cases (200 cases in 1,144 days). Upon categorizing the 386 motorcycle accident victims (male, n=333; female, n=53; mean±SD=30.3±12.9 [age range: 5-78]), under the main headings of motorcycle courier (n=137, 35.5%), individual motorcycle user (n=168, 43.5%), and motorcycle accident victim

(n=81, 21%), we found that 305 individuals were injured as drivers (79%), 33 as passengers (8.5%), 47 as pedestrians (12.2%), and 1 individual (0.3%) was in other positions. In the study, the average age of all groups was found to be  $30.3 \pm 12.9$  years (range: 5-78). When age groups were evaluated within their categories, the average age for the motorcycle courier group (n=137) was 25.7 years (range: 16–55), the average age for the individual motorcycle user group (n=168) was 31.8 years (range: 16–69), and the average age for the non-driver motorcycle victim group (n=81) was reported as 81 years. Additionally, we determined that the average age was 34.8 years (range: 5-78). We observed that the distribution of the statuses of the cases involved in the accident during and before the COVID-19 pandemic period was statistically significantly different ( $p < 0.001$ ). While the rate of encountering other motorcycle drivers was high before the pandemic, injuries to motorcycle couriers were recorded more frequently during the pandemic. Helmet use was also found to be significantly higher during the pandemic ( $p = 0.005$ ). Furthermore, we found that the usage of protective helmets among individ-

uals involved in accidents was 75.4% (291/386). This rate was significantly higher among motorcycle couriers, with 99.2% (136/137) using helmets, compared to a lower usage rate of 62.2% (155/249) in the other groups. It was also noted that all motorcycle riders who used helmets also wore protective clothing (Table 1).

While the rate of accidents involving collisions with pedestrians was high before the pandemic period, the rate of accidents involving collisions with other vehicle types was significantly higher during the pandemic period ( $p = 0.041$ ). Additionally, while the rate of minor injuries was high before the pandemic, the rate of severe accidents increased significantly during the pandemic ( $p = 0.003$ ).

Upon examining the mechanisms of injury, we found that accidents resulting from the loss of self-control (non-collision accidents) were predominant (n=225, 58.3%), whereas other mechanisms such as collisions with another vehicle (n=94, 24.4%), collisions with road structures (n=23, 6%), and collisions with pedestrians (n=44, 11.4%) were less common.

**Table 1.** Characteristics of victims involved in motorcycle accidents during the pre-pandemic and pandemic periods

Features	Pre-Pandemic	Pandemic	Total n (%)	p*
Total Victims Involved in the Accident	186	200	386 (100)	
Gender				
Male	156	177	333 (86.3)	0.186
Female	30	23	53 (13.7)	
Age (Years)				
5–14	4	2	6 (1.5)	0.078
15–24	66	100	172 (44.6)	
25–34	54	53	107 (27.8)	
35–44	24	22	47 (12.2)	
45–54	25	15	29 (7.5)	
55–64	10	7	16 (4.1)	
65+	8	1	9 (2.3)	
Status of Victims Involved in the Accident				
Driver Victims	138	168	305 (79.0)	0.001
Other Motorcycle Drivers	120	48	168 (43.5)	
Motorcycle Couriers	18	119	137 (33.5)	
Non-Driver Victims	48	33	81 (21.0)	
Pillion Passenger	16	17	33 (8.5)	
Pedestrian	31	16	47 (12.2)	
Other (Skater, etc.)	1	0	1 (0.3)	
Helmet Use				
Yes	127	165	291 (75.4)	0.005
No	30	18	46 (11.9)	
N/A (Pedestrian, etc.)	29	17	49 (12.7)	

N/A: Not Applicable; \*P-value was obtained from the Chi-square test.

**Table 2.** General characteristics of motorcycle and motorcycle courier accidents during the pre-pandemic and pandemic periods

Property	Pre-Pandemic n (%)	Pandemic n (%)	Total n (%)	p**
Weekday/Weekend Distribution				
Weekdays	130 (33.7)	142 (36.8)	272 (70.5)	
Monday	35	21		
Tuesday	28	30		
Wednesday	26	35		
Thursday	16	22		
Friday	25	34		
Weekend Days	56	58	114 (29.5)	
Saturday	29	29		
Sunday	27	29		
Time Intervals During the Day				
00:00-05:59	20	26	46 (11.9)	0.640
06:00-11:59	33	30	63 (16.3)	
12:00-17:59	71	69	140 (36.3)	
18:00-23:59	62	75	137 (35.5)	
Accident Mechanism				
Loss of Self-Control (No-Collision)	105	120	225 (58.3)	0.041
Collision with Another Vehicle	41	53	94 (24.3)	
Collision with Pedestrian	30	14	44 (11.4)	
Crash into Road Structures	10	13	23 (6.0)	
Injury Severity Score (ISS=0-75)				
Minor (ISS<9)	137	171	308 (79.7)	0.003
Moderate (ISS=9-15)	32	19	51 (13.1)	
Severe (ISS=16-24)	15	4	19 (4.9)	
Critical (ISS≥25)	3	6	9 (2.3)	
Need for Intubation	1	4	5 (1.3)	
Need for Surgical Intervention	40	27	67 (17.3)	
Need for Advanced Clinical Follow-Up				
Green/Yellow-1 Category (ED)*	145	172	317 (82.1)	0.163
Yellow-2/Red Category (ED)*	1	2	3 (0.8)	
Need for Inpatient Service	33	21	54 (14.0)	
Need for ICU	7	5	12 (3.1)	
Outcome				
Survivor	186	198	384 (99.5)	
Exitus	0	2	2 (0.5)	

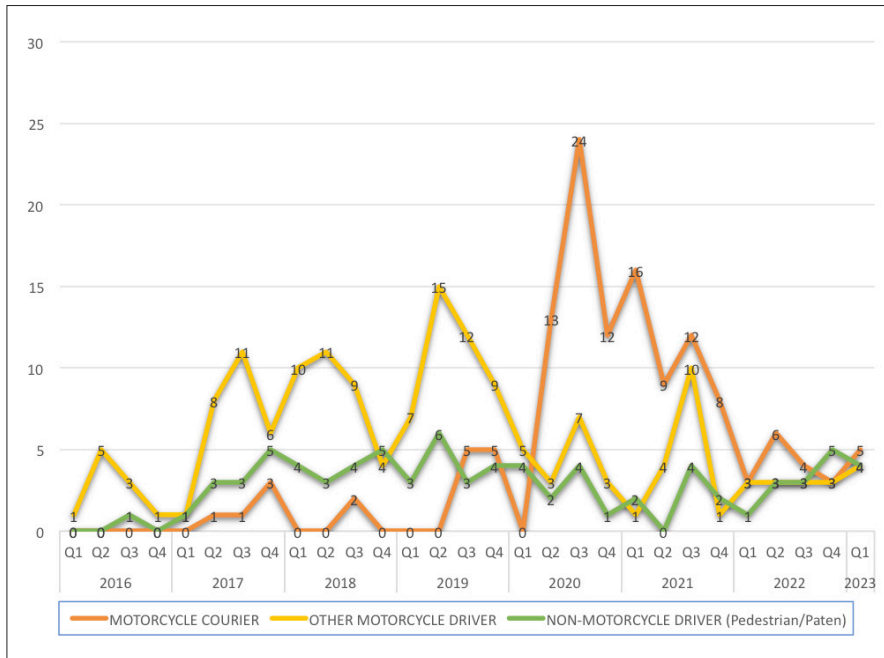
\*Victims whose follow-up and treatment were completed in the emergency department. \*\*P-value was obtained from the Chi-square test. ED: Emergency Department; ICU: Intensive Care Unit.

Furthermore, accidents were more frequent on Wednesdays (n=60, 15.5%) compared to other days, and during the hours between 12:00 and 17:59 (n=140, 36.3%) (Table 2).

When examining the time distributions of accidents (year, month, day, and hour), we found that the highest number of motorcycle accidents was recorded in 2020 (n=78, or 20.2%). Overall, considering all time periods, we noted that accidents

in August (n=50, 13%) were more frequent compared to other months (Fig. 1).

When examining the locations of motorcycle-related traumas on the body, we found a total of 669 traumatic locations. The most common injuries were to the lower extremities (including pelvis) (n=274, 41%), upper extremities (n=191, 28.6%), and head and neck (n=106, 15.8%), respectively (Fig. 2).<sup>[9]</sup>



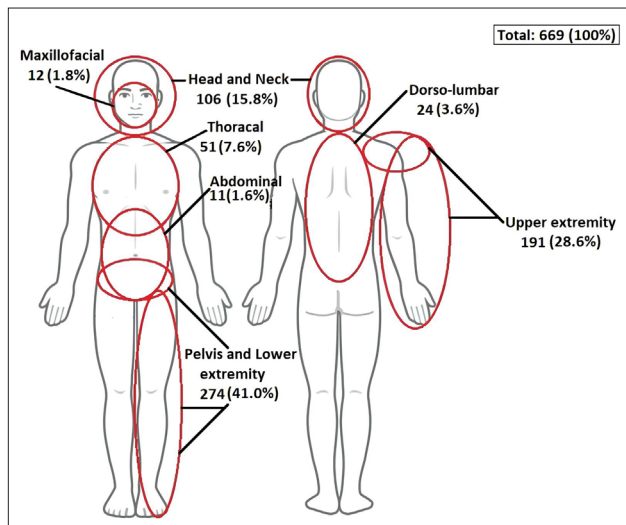
**Figure 1.** Time trends of motorcycle and motorcycle courier accidents during the pre-pandemic and pandemic periods. (Q: Quarter of the year; Q1: January-February-March; Q2: April-May-June; Q3: July-August-September; Q4: October-November-December.)

Upon examining all the accident victims for the presence and distribution of fractures, we identified a total of 175 fractures. The majority of these occurred in the upper extremities, pelvis, and lower extremities. The most common fractures identified were radius fractures (n=15, 8.5%), fibula fractures (n=12, 6.8%), clavicle fractures (n=8, 4.5%), tibia fractures (n=8, 4.5%), and metatarsal fractures (n=8, 4.5%) (Fig. 3).

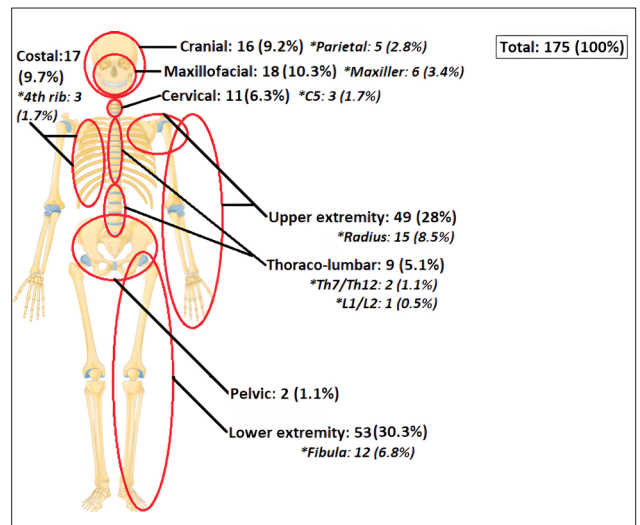
In motorcycle accidents, other serious injuries such as ligament and meniscus tears, tendon injuries, pneumothorax, lung contusions, liver/spleen injuries, cerebral contusions, traumatic subarachnoid hemorrhage (SAH)/intracranial hem-

orrhage (ICH), diffuse axonal injury, brachial plexus injury, and tetraplegia were also examined. SAH/ICH (n=9, 39.2%) was the most common of these injuries (Table 3).

When the relationship between the injury region and the ISS was examined, it was found that individuals with injuries in the head-neck, maxillofacial, thoracic, lower extremity (including pelvis), and dorsolumbar regions had a statistically significantly higher ISS (p<0.05). When analyzing the relationship between accident details and the ISS, it was determined that the ISS was statistically significantly affected by the accident victim's status during the accident (motorcycle courier,



**Figure 2.** Distribution of motorcycle accident-related injuries by body parts.<sup>[9]</sup>



**Figure 3.** Distribution of motorcycle accident-related fractures by bones in the body.



**Table 3.** Soft tissue injuries caused by motorcycle accidents during the pre-pandemic and pandemic periods

Damages by Organ Systems	Pre-Pandemic	Pandemic	Total n (%)*
Neuroparenchymal Damage	8	7	15 (65.2)
Traumatic SAH/ICH	5	4	9 (39.2)
Cerebral Contusion	0	2	2 (8.7)
Diffuse Axonal Injury	2	0	2 (8.7)
Tetraplegia	0	1	1 (4.3)
Brachial Plexus Injury	1	0	1 (4.3)
Thoracic Parenchymal Damage	3	0	3 (13.0)
Pneumothorax	2	0	2 (8.7)
Lung Contusion	1	0	1 (4.3)
Blunt Abdominal Trauma	1	1	2 (8.7)
Liver Contusion	1	0	1 (4.3)
Splenic Rupture	0	1	1 (4.3)
Connective Tissue Injury	2	2	4 (13.0)
Intra/Extra-Articular Ligament and Meniscus Injuries	1	1	2 (8.7)
Tendon Laceration/Rupture	1	1	2 (4.3)
Total	14	10	24 (100)

\*P-value could not be calculated due to the small number of parameters for comparison. ICH: Intracerebral Hemorrhage; SAH: Subarachnoid Hemorrhage.

individual motorcycle user, motorcycle accident victim) and helmet usage ( $p=0.009$  and  $p=0.045$ , respectively). Post-hoc analysis revealed that motorcycle couriers had significantly lower ISS compared to other accident victims. It was also found that accident victims who used helmets had significantly lower ISS values compared to those who did not, and the accident mechanism did not affect the ISS statistically significantly ( $p=0.065$ ) (Table 4).

When major trauma ( $ISS \geq 16$ ,  $n=28$ ) and minor trauma ( $ISS < 16$ ,  $n=358$ ) cases were evaluated separately, the total number of broken bones ( $p < 0.001$ ), the total number of thoracic vertebra bone fractures ( $p=0.048$ ), and the ISS were found to be statistically significantly higher in major trauma cases ( $p < 0.001$ ) (Table 5).

When examining the relationships between the total number of bone fractures, soft tissue traumas, and ISS values, it was observed that as the total number of bone fractures and soft tissue traumas increased, ISS values also increased significantly ( $r=0.758$ ,  $r=0.756$ , and  $p < 0.001$ , respectively). (Note:  $r$  represents the Spearman correlation coefficient; the correlation is significant at the 0.05 level and the 0.01 level, respectively.) When the relationship between the presence of major trauma ( $ISS \geq 16$ ,  $n=28$ ) and trauma regions was examined, it was determined that the presence of major trauma occurred at a significantly higher rate in cases with head and neck trauma ( $n=13$ , 46.4%) and in cases with maxillofacial trauma ( $n=5$ , 17.9%) ( $p < 0.05$ ), respectively. ( $p$ -values were obtained from the Pearson Chi-square or Fisher's exact test.)

## DISCUSSION

The COVID-19 pandemic is not only a lethal viral disease, but it has also caused new problems due to changes in lifestyle, including during lockdowns. Motorcycle and motorized courier accidents, which increased during this pandemic period, can be considered one of these consequences.<sup>[10,11]</sup>

As stated in current literature, the victims of motorcycle accidents are often young and male.<sup>[12]</sup> We found the average age of all accident victims included in our study to be 30.3 years, which is consistent with the literature. In a study by Rocha et al., the average age was reported as 31.21.<sup>[11]</sup> Da Silva et al. found an average age of 29.5 in their series of 750 cases.<sup>[13]</sup> Yun et al. reported a mean age of  $17.1 \pm 1.9$  in their study of 16,932 cases.<sup>[14]</sup>

When examining the distribution of motorcycle accidents over time, it was found that motorcycle accidents were most common in August. Additionally, when analyzing the distribution of accidents by days of the week, it was observed that the fewest accidents occurred on Tuesdays. While there was no statistically significant difference, the highest number of accidents occurred on Wednesdays. Regarding the time of day, it was determined that the probability of an accident was higher between 12:00–17:59 and 18:00–24:00 (Table 2). In another study, it was observed that the highest number of motorcycle accidents occurred in June, with Saturdays (23.2%) and Sundays (20.8%) having the highest accident rates by day, and accidents were more frequent between 18:00 and 24:00.<sup>[13]</sup> Yun et

**Table 4.** The relationship between the mean ISS according to trauma location and accident details

Parameter	ISS [Injury Severity Score]	
	M [Q1-Q3]	p-value*
Head and Neck		
Yes	3 [2-7]	<0.001
No	1 [1-4]	
Maxillofacial		
Yes	12 [8-21]	<0.001
No	2 [1-5]	
Thoracic		
Yes	3 [2-9]	<0.001
No	2 [1-4]	
Abdominal		
Yes	3 [2-7]	0.088
No	2 [1-5]	
Upper Extremity		
Yes	2 [1-5]	0.873
No	2 [1-5]	
Lower Extremity and Pelvis		
Yes	2 [1-4]	0.001
No	4 [1-9]	
Dorso-Lumbar		
Yes	3 [2-5.5]	0.044
No	2 [1-5]	
Victim's Status		
Motorcycle Courier	<sup>a</sup> 1 [1-4]	0.009
Other Motorcycle Driver	<sup>b</sup> 2.5 [1-6]	
Non-Motorcycle Driver (Pedestrian/Skater, etc.)	<sup>b</sup> 2 [1-6]	
Victim's Position		
Driver	2 [1-5]	0.401
Passenger	2 [1-4]	
Pedestrian	3 [1-9]	
Other (Skater, etc.)	2 [2-2]	
Helmet Use		
Yes	<sup>a</sup> 2 [1-5]	0.045
No	<sup>b</sup> 3 [1-4]	
N/A (Pedestrian, etc.)	<sup>a</sup> 2 [1-9]	
Accident Mechanism		
Loss of Self-Control (Non-Collision Accident)	2 [1-5]	0.065
Collision with Another Vehicle	2 [1-4]	
Crash into Road Structures	2 [1-9]	
Collision with Pedestrian	4 [1-9]	

M: Median; N/A: Not Applicable; Q1: Quartile 1 (P25); Q3: Quartile 3 (P75). P-values for trauma location comparisons were obtained using the Mann-Whitney U test, and for accident detail comparisons, using the Kruskal-Wallis test. Within each row, different superscript letters (a, b, c) indicate significant differences ( $p < 0.05$ ) as determined by the Kruskal-Wallis all pairwise post hoc test.

al. stated that accidents were more frequent between 00:00 and 05:59 (50.1%).<sup>[9]</sup> The increased frequency of accidents, especially between 18:00 and 24:00, may be related to the higher density of deliveries and orders during this time period.

In our study, we found that the rate of helmet usage among individuals involved in accidents was 75.4%, with this rate rising to 99.2% among motorbike couriers. Additionally, it is noteworthy that all motorcycle couriers used protective clothing. This could be attributed to both the legal requirements for motorbike courier drivers in their profession and their heightened awareness of accident prevention due to their continuous use of motorcycles.

We observed that accident victims who used helmets had a significantly lower ISS compared to those who did not ( $p < 0.05$ ). Considering similar studies in the literature, Yun et al. reported a helmet usage rate of 46.7% in their study.<sup>[14]</sup> A study conducted in Shanghai showed that the helmet-wearing rate among couriers was 34.14% for food delivery and 10.18% for express delivery.<sup>[15]</sup> Consistent with our study's results, it was emphasized in this study that legal regulations regarding helmet use should be urgently implemented, as they can effectively reduce injuries and fatalities in traffic accidents.<sup>[16-18]</sup> In a study by Liasidis et al. involving 22,855 cases, it was found that non-helmeted accident victims had a higher risk of major trauma. According to this study, the most frequently injured body region among non-helmeted individuals was the head (56.9%,  $p < 0.001$ ), while for helmeted individuals, it was the lower extremities (65.3%,  $p < 0.001$ ). Non-helmeted individuals had a higher likelihood of admission to the intensive care unit, a greater need for mechanical ventilation, and a significantly higher mortality rate (6.3%,  $p < 0.001$ ). The study also found a significant statistical relationship between helmet usage and a reduced risk of death.<sup>[19]</sup> In our study, due to the high rate of helmet usage in the motorcycle courier group, it was determined that both the severity of injuries and ISS values were lower compared to other groups. In our study, due to the high rate of helmet use in the motorcycle courier group, it was determined that injury severity and ISS values were lower than in other groups. We believe that wearing a helmet is crucial for reducing the severity of injuries in motorcycle accidents.

Considering the injury regions of accident victims, we found that the most common injuries were to the lower extremities and pelvis (71%, 274/386). In another study, a 75.48% rate of lower extremity injuries was reported,<sup>[13]</sup> while Yun et al. noted a frequency of lower extremity injuries of 56.9%.<sup>[14]</sup> Peek et al. reported a frequency of 54% for lower extremity injuries in their study of 700 cases.<sup>[20]</sup> Craig et al. observed in their study that lower extremity injuries were the most common in motorcycle accidents and were one of the main reasons for prolonged hospital stays.<sup>[21]</sup>

When examining accident victims in terms of fracture regions, we found that the most common injury was radius fractures ( $n = 15$ , 8.5%). In a study by Yun et al., which examined 16,932

**Table 5.** Differences in median age, ISS, and number of fractures according to major trauma

Parameter	Major Trauma (ISS≥16)		p-value*
	Yes (n=28) M [Q1-Q3]	No (n=358) M [Q1-Q3]	
Age	24 [21.5-44.5]	26 [21-36]	0.656
Total Number of Fractured Bones	2 [1-3]	0 [0-0]	<0.001
Total Number of Traumas	1 [1-2.5]	2 [1-2]	0.992
Total Cranial Bone Fractures	0 [0-0]	0 [0-0]	0.078
Total Cervical Vertebra Fractures	0 [0-0]	0 [0-0]	0.663
Total Thoracic Vertebra Bone Fractures	1 [0-2]	0 [0-0]	0.048
Total Rib Fractures	0 [0-0]	0 [0-0]	0.176
Total Upper Extremity Fractures	0 [0-0]	0 [0-0]	0.621
Total Pelvis and Lower Extremity Fractures	0 [0-0]	0 [0-0]	0.117
ISS (Injury Severity Score: 0-75)	17 [16-25]	2 [1-4]	<0.001

\*P-value was obtained from the Mann-Whitney U test. M: Median; Q1: Quartile 1 (P25); Q3: Quartile 3 (P75).

motorcycle accident cases, the wrist and forearm were reported as the most frequently fractured regions (37%).<sup>[14]</sup> Dupaix et al. also reported that the wrist and forearm were the most common fracture regions in their study of 578 motorcycle accidents.<sup>[22]</sup>

### Limitations

The limitations of this clinical study include its reliance on a single-center patient population.

### CONCLUSION

This study aimed to examine and assess motorcycle accidents during the COVID-19 pandemic. Our findings indicate that the pandemic's measures to limit society's mobility have led to an increase in motorcycle accidents. Furthermore, there was a significant increase in the number of accidents, particularly during individual motorcycle use and motor courier services.

The severity of these accidents varied depending on certain factors. These findings may help us understand the unintended consequences of the measures taken to protect public health during the pandemic. According to our research, the majority of individuals injured in motorcycle accidents during the pandemic period were drivers. Helmet use was more common among motorcycle couriers but was detected at a lower rate in other groups. When examining the mechanisms of accidents, it was observed that accidents caused by loss of self-control were predominant. The use of personal protective equipment, including helmets, and careful driving have been shown to reduce the severity of injuries. These findings can provide an important basis for shaping measures to reduce the severity of motorcycle crashes and the resulting injuries.

### Limitations

Given the limitations of our study, we recommended future studies to include analyses based on larger samples and data

from different geographical regions. This may help us better understand the relationship between motorcycle accidents and unusual circumstances, such as pandemics.

**Ethics Committee Approval:** This study was approved by the Biruni University Faculty of Medicine Ethics Committee (Date: 08.03.2023, Decision No: 2023/83-27).

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## ORJİNAL ÇALIŞMA - ÖZ

### COVID-19 pandemisi sırasında artan motosiklet kazalarının analizi: Türkiye'den tek merkezli bir çalışma

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**AMAÇ:** COVID-19 pandemisi, dünya genelinde sağlık sistemlerini zorlayan ve toplumların yaşam biçimlerini etkileyen benzersiz bir durumu beraberinde getirdi. Sosyal izolasyon önlemleri, seyahat kısıtlamaları ve iş yerlerinin kapanması gibi önlemler, motosiklet kullanımının artmasına ve bu dönemde motosiklet kazalarının önemli bir sorun haline gelmesine yol açtı. Bu klinik araştırmanın amacı, COVID-19 Pandemisi dönemindeki motosiklet kazalarını incelemek ve bu kazaların artışının nedenlerini ve sonuçlarını detaylı olarak incelemektir.

**GEREÇ VE YÖNTEM:** Bu çalışmada tek sağlık merkezine ait tıbbi kayıtlar incelenmiş ve belirlenmiş bir zaman aralığındaki motosiklet kazalarının analizi için çeşitli yöntemler kullandık. Ayrıca, ülkemizde pandeminin başlangıcından önce ve sonra motosiklet kullanımı ile kazalar arasındaki ilişkiyi incelemek için istatistiksel analizlerini yaptık. Biruni Üniversitesi Tıp Fakültesi Hastanesi'nde Kasım 2015-Nisan 2023 tarihleri arasında kayda geçirilmiş, motosiklet kazası öyküsü ile yaralanan ve aynı merkezde takip, tedavisi yapılan 386 hastanın kayıtları retrospektif olarak incelendi. Olguların yaş, cinsiyet, yaralanma mekanizması, yaralanma bölgesi, yaralanma ciddiyeti, kask kullanımı, kırık varlığı ve bölgesi, kazanın zaman dağılımı ve diğer önemli doku yaralanmalarının ciddiyet durumlarını ve yaralanma bölgesi, kırıklar ve kaza detayları ile "Yaralanma Şiddeti Skoru" (Injury Severity Score –ISS) arasındaki ilişkiyi araştırdık.

**BULGULAR:** Motosiklet kazalarında yaralanan 386 kazazedinin (Erkek n=333, Kadın n=53), motorsikletli kurye (n=137, %35.5), bireysel motosiklet kullanıcısı (n=168, %43.5), motosiklet kazası mağduru (n= 81, %21) ana başlıkları altında dağılımı incelendiğinde, 305 kazazedinin sürücü (%79), 33'ünün (%8.5) motorsiklet yolcusu, 47 kazazedinin yaya (%12.2) ve 1 kazazedinin (%0.3) ise paten sürücüsü olduğunu belirledik. Yaralanma mekanizmaları incelendiğinde; otokontrolü kaybetme -çarpışmasız kazalar- nedeniyle oluşan kazaların baskın olduğu (n=225, %58.3) görüldü. Kazazedelerin tamamı kırık varlığı ve kırık bölgesi yönünden incelendiğinde; toplamda 175 kırık saptadık. Sürücülerde kırıkların daha çok sıklıkla üst ekstremiteler, pelvis ve alt ekstremitelerde kırıklarla şeklinde olduğunu bulduk. Tüm olgular kemik kırıkları ve yumuşak doku yaralanmaları yönünden incelendiğinde; total kemik kırığı sayısı ve total yumuşak doku travması sayıları arttıkça ISS değerlerinin artış gösterdiğini belirledik.

**SONUÇ:** Klinik çalışmamızın bulguları, COVID-19 pandemisinin toplumun hareketliliğini sınırlamak için alınan önlemlerin motosiklet kazalarında bir artışa neden olduğunu göstermektedir. Özellikle bireysel motosiklet kullanımı ve motorlu kurye hizmetleri sırasında meydana gelen kazaların sayısında belirgin bir artış saptanmıştır.

**Anahtar sözcükler:** COVID-19; kurye; kaza; motorsiklet; pandemi.