

## Investigation of the effect of COVID-19 on upper extremity trauma

Effect of COVID-19 on upper extremity trauma

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### Abstract

**Aim:** Our study aims to evaluate the upper extremity trauma that admitted to our hospital from April 11, 2020, to June 1, 2020, the days when the restrictions were applied in Turkey, and to investigate the effect of COVID-19 on upper extremity trauma by comparing with the data of a year ago between the same dates.

**Material and Methods:** Demographic information, trauma details, and region, and the treatment method of patients with any upper extremity trauma who were over the age of 18 and admitted to the hospital between April 11, 2019, and June 1, 2019 (2019-Before Restrictions) and between April 11, 2020, and June 1, 2020 (2020-Lockdown) were examined retrospectively.

**Results:** In 2019-Before Restrictions, 218 patients and in the 2020-Lockdown, 163 patients were admitted to the hospital due to upper extremity trauma. The number of hospital admissions with upper extremity trauma during the 2020-Lockdown was 25.22% less than that of those in 2019-Before Restrictions, ( $p<0.05$ ). While the number of patients admitted to the hospital due to fractures in the upper extremity during 2019-Before Restrictions, was 89 (Open Fracture=32, Closed Fracture=57), this number was observed to decrease to 48 (Open Fracture=11, Closed Fracture=37) in the 2020-Lockdown ( $p<0.05$ ).

**Discussion:** It was determined that there was a decrease in upper extremity trauma during 2020-Lockdown compared to the same dates of the previous year. It is possible to state that quarantine practices applied to prevent the spread of COVID-19 affect the decrease in upper extremity trauma.

### Keywords

COVID-19, Upper Extremity, Hand, Trauma, Fracture

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## Introduction

A new coronavirus, which emerged in late 2019 and is transmitted through droplets, has been detected [1, 2]. The World Health Organization (WHO) declared a global state of emergency for the disease caused by this virus on January 30, 2020 and then named this new virus SARS-CoV-2 and the disease COVID-19 on February 11, 2020 [3, available at: [www.who.int/emergencies/diseases/novel-coronavirus-2019](http://www.who.int/emergencies/diseases/novel-coronavirus-2019)]. Official authorities announced that the first case of COVID-19 was detected in Turkey on March 11, 2020, the day the WHO declared this global epidemic a pandemic [available at: [www.who.int/emergencies/diseases/novel-coronavirus-2019](http://www.who.int/emergencies/diseases/novel-coronavirus-2019), available at: <https://covid19.saglik.gov.tr/TR-66935/genel-koronavirus-tablosu.html>]. In the following days, COVID-19 infections continued to increase in Turkey, and it was announced that as of March 16, 2020, all schools and universities would suspend education and then continue with online education [available at: [https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de\\_COVID-19\\_pandemisi#cite\\_note-daily.sabah](https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_COVID-19_pandemisi#cite_note-daily.sabah)]. All countries had to close the workplaces, schools, universities, and social areas and implement mandatory quarantine due to the ongoing global COVID-19 pandemic. While restaurants, cafes, museums, classrooms, shopping centers, hotels, barbers, hairdressers and beauty centers, coffee shops, sports halls, concert venues, night clubs, and wedding/engagement halls are temporarily closed; all citizens were forbidden to have picnics and barbecues in forests, parks, and gardens. All sports leagues in the country have been postponed, and all sports competitions have been canceled until further notice [available at: [https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de\\_COVID-19\\_pandemisi#cite\\_note-daily.sabah](https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_COVID-19_pandemisi#cite_note-daily.sabah)]. Official authorities first started a curfew for people aged 65 and over in order to reduce the spread of the pandemic and maintain social distance between people. Later, this restriction expanded in a way to include children and youth aged 20 and younger. People were urged not to travel abroad or leave their house unless absolutely necessary [available at: [https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de\\_COVID-19\\_pandemisi#cite\\_note-daily.sabah](https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_COVID-19_pandemisi#cite_note-daily.sabah)]. On April 11-12, curfews were declared in 31 cities, which is how mass curfews began. Curfews, which have been continuing at regular intervals since this date, continued until June 1, 2020, together with “controlled social life” [available at: [https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de\\_COVID-19\\_pandemisi#cite\\_note-daily.sabah](https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_COVID-19_pandemisi#cite_note-daily.sabah)].

Current COVID-19 measures and restrictions have also inevitably changed practices in hospitals and healthcare [4]. When the literature was reviewed, the studies showing how upper extremity trauma were affected by the current pandemic during both restriction and reopening periods during the pandemic were studies either on the experience of hand surgeons or on the elbow and shoulder only, or on the immature elbow and shoulder joint [3-5]. Conducting a comprehensive retrospective analysis of the upper extremity trauma of COVID-19 in the light of our current knowledge will be valuable in showing how upper extremity trauma has changed. Hence, the hypothesis of our study is restrictions in the pandemic process may lead to a decrease in upper extremity trauma. Therefore, our study aims to evaluate the upper extremity trauma that admitted to our

hospital serving in Antalya [available at: <http://www.antalya.gov.tr/nufus>], which is the 5th most crowded city of Turkey in terms of population, from April 11, 2020, to June 1, 2020, the days when the restrictions were applied in Turkey, and to investigate the effect of COVID-19 on upper extremity trauma by comparing with the data of a year ago between the same dates.

## Material and Methods

The hospital records of a total of 551 patients who were admitted due to trauma to Akdeniz University Faculty of Medicine Orthopedics and Traumatology Department between April 11, 2019, and June 1, 2019 (2019-Before Restrictions) and between April 11, 2020, and June 1, 2020 (2020-Lockdown) were retrospectively analyzed. A total of 218 patients with any upper extremity trauma (aged between 18 and 86, with a mean age of  $40.21 \pm 16.76$  years), 67 females and 151 males in 2019-Before Restrictions, and 48 females and 115 males in total, 163 upper extremity trauma patients (aged between 18 and 88, with a mean age of  $40.52 \pm 15.18$  years) in the 2020-Lockdown, those who were older than 18 years of age and had any upper extremity trauma were included in the study. Those under the age of 18 and who had trauma in any region other than upper extremity trauma were not included in the study.

Demographic information, trauma details, and region, treatment method (surgical or conservative) of the patients were obtained using the MIA-MED (Version 1.0.1.4021, MIA Technology Inc.) hospital system. The study was approved by Akdeniz University Faculty of Medicine Clinical Research Ethics Committee (70904504/277, Decision No: KA EK-307).

### Statistical Analysis

The Windows-based SPSS (IBM SPSS Statistics, Version 23.0, Armonk, NY, USA) package program was used for statistical analysis of the data obtained in our study. Categorical data were expressed as mean, standard deviation, numbers, frequency, and percentage. To compare 2019-Before Restrictions and 2020-Lockdown, the Chi-square or Fisher exact test was used. Statistical significance was determined as  $p < 0.05$ .

## Results

Between April 11, 2019, and June 1, 2019 (2019-Before Restrictions), 218 patients, and between April 11, 2020, and June 1, 2020 (2020-Lockdown), 163 patients were admitted to the hospital due to upper extremity trauma. The number of hospital admissions with upper extremity trauma during 2020-Lockdown was 25.22% less than that of those in 2019-Before Restrictions

**Table 1.** Demographic characteristics of the patients

	Gender		Total (n, %)
	Female (n, %)	Male (n, %)	
2019-Before Restrictions	67, 30.7	151, 69.3	218, 100.0
2020-Lockdown	48, 29.4	115, 70.6	163, 100.0
	Age (year)		mean $\pm$ SD
	min-max		
2019-Before Restrictions	18 – 86		40.21 $\pm$ 16.76
2020-Lockdown	18 – 88		40.52 $\pm$ 15.18

**Table 2.** Results of anatomical localization of the fracture

	Localization of the Fracture										
	Scapula	Clavicle	Humerus		Radius		Ulna		Fractures of the Distal End Radius+Ulna	Hand	
2019-Before Restrictions	1	0	Proximal	10	Proximal	4	Proximal	4	8	Carpal	5
			Shaft	7	Shaft	3	Shaft	2		Metacarpal	13
			Distal	6	Distal	3	Distal	2		Phalanx	20
					Shaft+Distal	1					
Total (n=89)	1	0	23		11		8		8	38	
2020-Lockdown	2	3	Proximal	4	Proximal	1	Proximal	2	5	Carpal	2
			Shaft	1	Shaft	4	Shaft	1		Metacarpal	6
			Distal	1	Distal	3	Distal	3		Phalanx	9
					Shaft+Distal	1					
Total (n=48)	2	3	6		9		6		5	17	

**Table 3.** Results of soft tissue injury

Soft Tissue Injury			
		n	%
2019-Before Restrictions	Vascular + Nerve Injuries	25	16.4
	Flexor Tendon Injuries	42	27.6
	Extensor Tendon Injuries	36	23.7
	Crush Injuries	32	21.1
	Vascular + Nerve + Flexor Tendon Injuries	17	11.2
	Total	152	100
2020-Lockdown	Vascular + Nerve Injuries	19	18.1
	Flexor Tendon Injuries	22	20.9
	Extensor Tendon Injuries	17	16.2
	Crush Injuries	36	34.3
	Vascular + Nerve + Flexor Tendon Injuries	11	10.5
	Total	105	100

(p<0.05). Demographic characteristics of the patients are presented in Table 1.

While the number of patients admitted to the hospital due to fractures in the upper extremity during 2019-Before Restrictions was 89 (Open Fracture=32, Closed Fracture=57), this number was observed to decrease to 48 (Open Fracture=11, Closed Fracture=37) in 2020-Lockdown (p<0.05). Among the patients admitted to the hospital due to fracture, the number of patients with a fractured humerus was 23 during 2019-Before Restrictions and 6 during 2020-Lockdown. There was no statistical difference between the two periods in terms of the presence of dislocation (2019-Before Restrictions=5, 2020-Lockdown=6; p>0.05).

In terms of soft tissue injuries, 152 patients were determined in 2019-Before Restrictions and 105 patients in 2020-Lockdown (p>0.05). In 2019-Before Restrictions, 129 (59.2%) of 218 patients were treated surgically, and 89 (40.8%) received conservative treatment, while 89 (54.6%) of 163 patients in 2020-Lockdown were treated surgically and 74 (45.4%) received conservative treatment. Information about other upper extremity trauma is presented in Table 2 and Table 3.

**Discussion**

The quarantine practices and curfews applied due to the

COVID-19 pandemic led to a different experience for humanity, and the kind of changes that occurred in the data on upper extremity trauma throughout this process was an object of interest. In our study, we compared the upper extremity trauma between April 11 and June 1, 2020, when quarantine was applied during the COVID-19 pandemic, which continues as a global epidemic and affected many areas of life, and the data of the previous year between the same dates and examined the effect of COVID-19 on upper extremity trauma. Our study revealed that the number of patients admitted to our hospital due to upper extremity trauma was 25.22% less in 2020, when quarantine was implemented during the COVID-19 pandemic, compared to the previous year. In a study investigating the effect of COVID-19 on shoulder and elbow trauma, the decrease in the number of patients during the COVID-19 period was similar to our study [3]. Likewise, Fylos et al. [6] have reported that the number of patients with orthopedic problems in the upper extremity was significantly lower in 2020 compared to a year ago. Another study on the effects of COVID-19 quarantine on hand surgery applications has reported a 32% decrease in patients compared to the previous year [7]. The decrease in patient numbers observed in our current study is consistent with the literature. The quarantine practices applied to prevent the COVID-19 pandemic have prevented situations such as traffic accidents, work accidents, and sports injuries that may cause trauma in the upper extremity, and therefore this suggests that it leads to a decrease in upper extremity trauma. However, as have been stated by Gumina et al. [3] it should also be taken into account that patients with mild trauma may not have been admitted to the hospital due to the fear of being infected with the coronavirus. Similarly, it is possible that maintaining a more relaxed lifestyle [8] together with the first shock experienced during the quarantine period results in a decrease in upper extremity trauma.

During the 2020-Lockdown, although there was a significant decrease in the humerus (23 to 6) and hand (38 to 17) fractures, the numbers for other upper extremity regions remained almost the same. A study investigating the effect of curfews on hand and upper extremity injuries revealed a 65% decrease in all upper extremity injuries [9]. In similar studies, where a decrease was detected in upper extremity injuries, it has been observed

that there was a decrease, however, the rate was not very high [10, 11]. In our study, there was a 25.22% decrease in all upper extremity traumas, and the results are consistent with the literature. Moreover, our study determined that with the decrease in the number of patients with upper extremity trauma during the 2020-Lockdown, a decrease was detected in both surgical and conservative treatments. Atia et al. [7] reported performing surgical procedures with a 20% decrease in lockdown in 2020. This situation, which we encountered in our study, reveals that the decrease in both treatment methods due to the decrease in the number of patients is an expected result. We considered that decrease in both surgical and conservative treatments resulted from patients attending less activity and hospital admissions because of minor trauma in quarantine practices during the restriction process.

The decrease in soft tissue injuries in our current study supports the studies in the literature indicating the decrease in upper extremity soft tissue injuries during the COVID-19 period [12, 13]. Although this decrease in our study was not statistically significant, it is remarkable that the decrease in tendon injuries decreased during the 2020-Lockdown. Tendon injuries can occur from open cuts in the hand, trauma such as injury, and crushing with a sharp object [14, 15]. On the other hand, it is known that the most common causes of hand injury are tool and machinery use [7]. It is possible to state that there is a decrease in soft tissue injuries resulting from not being in workplace environments that may cause soft tissue injuries and not using devices and machines in the workplace due to quarantine practices, and preventing sports trauma in closed sports centers.

There are strengths and limitations in our study. The strength of our study is that there are not many studies that specifically evaluate the effects of COVID-19 only on the entire upper extremity. In similar studies, either some parts of the upper extremity or all trauma patients were included [3, 5, 16, 17]. The fact that it is a single-centered study may prevent the generalization of the results of our study can be stated as a limitation. Therefore, multicenter studies are needed.

### Conclusions

We found that there was a decrease in upper extremity trauma in 2020-Lockdown compared to the same dates in the previous year. Therefore, the hypothesis of our study was accepted. It is possible to state that quarantine practices applied to prevent the spread of COVID-19 affect the reduction in upper extremity trauma.

### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

### Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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### Conflict of interest

None of the authors received any type of financial support that could be considered

potential conflict of interest regarding the manuscript or its submission.

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