

Coronavirus disease 2019 pandemic, restriction, and orthopedic trauma

Retrospective observational study

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Abstract

In 2019, the Coronavirus disease 2019 (Covid-19) was reported in Wuhan, China. Governments in various countries had taken many safeguards. This study investigated the incidence of orthopedic trauma in a rural region epidemiologically and guided source distribution and medical professionals to sustain healthcare systems.

Between December 2019 and August 2020, 1651 patients admitted to orthopedics and traumatology clinics with trauma were evaluated in this study. Patients were grouped into 3 groups: pre-covid, restriction, and permitted groups. Age, sex, and fracture types of patients were recorded.

The number of patients in the pre-covid period was 629 (38.1%), those were 334 (20.2%) in the restriction period, and 688 (41.7%) patients were admitted in the permitted period. A total of 1203 (72.9%) patients with upper extremity fractures, 383 (23.2%) patients with lower extremity fractures, and 65 (3.9%) patients with axial skeleton and pelvic ring fractures were included in the study. The lowest rates were found in the restriction period when all fractures were evaluated according to the admission periods. There were significant differences between admission dates and the fractures ($P < .001$).

In this study, a decrease in orthopedic trauma rates was observed by half in the restriction period compared with the other 2 periods. Public health precautions had led to a reduction in the incidence of orthopedic trauma in all age groups.

Abbreviation: Covid-19 = Coronavirus disease 2019.

Keywords: bone fractures, coronavirus ;coronavirus-2 of severe acute respiratory syndrome, orthopedics, Turkey

1. Introduction

In 2019, Coronavirus (Coronavirus disease 2019 [Covid-19]) was first reported in Wuhan, China.^[1] In March 2020, the World

Health Organization declared the disease a pandemic after spreading globally.^[2] This virus is highly contagious and has a high death ratio.^[3] Because of ineffective vaccines or treatments to prevent viral transmission and eliminate the damage on the human body, some governments announced health care cautions such as restrictions, curfew, and social isolation.^[4]

Many kinds of precautions were taken in several territories and cities because of the different demographical structures of Turkey. Curfew was begun in crowded and positively spreading regions; however, certain precautions like lockdown for age above 65 or below 20 years old were applied in the slow-spreading areas. Also, people were in close contact with each other, like cinemas, gyms, restaurants, shopping centers, schools, and universities were closed. We detected a decrease in the number of patients because of these precautions and diminished social mobility.

Our hospital is in a rural region with a low population density and is the only hospital that admits patients with Covid-19 and other diseases. Doctors, nurses, and other laborers were challenged with the Covid-19 pandemic, like all other hospitals. Some precautions like canceling elective surgeries and restriction in outpatient clinics were taken not to halt orthopedics and traumatology service.

This study investigates the incidence of orthopedic trauma in a rural region epidemiologically and guides personal and source distribution to maintain health infrastructure.

2. Materials and methods

In this retrospective study, 1651 patients, who applied to the orthopedics and traumatology outpatient clinic with a history of trauma, were evaluated between December 2019 and August

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Informed Consent: N/A.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request. The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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2020. An institutional hospital medical database was used to gather the information for this study. Missing files or files with incompetent details were excluded from the study. The ethical approval for this study was obtained from the Clinical Research Ethics Committee of Ağrı Training and Research Hospital (approval date: 11.11.2020, approval number: 17). Dates for admission to the clinic were grouped in 3 months as pre-covid (December, January, February), restriction period (March, April, May), and permitted period (June, July, August). Age, sex, and fracture types were recorded. Age distribution was categorized into 5 groups. Fracture types were categorized into 3 groups. These 3 groups were upper extremity fractures, lower extremity fractures, and axial skeleton and pelvic fractures. All these groups were compared between 3 different periods and age groups.

2.1. Statistical analysis

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) for Windows 23.0 (IBM Corp., Armonk, NY). Frequencies and percentages were used to report demographics and other data. For the numeric values, the arithmetic means and standard deviation were computed. The distribution characteristics of the data were determined by the Shapiro-Wilk test, while Levene test calculated the homogeneity of variances. Student *t* tests were used to compare parameters between the 3 groups. The comparison between the groups was performed using the analysis of variance test. $P < .05$ was considered statistically significant (Supplemental Digital Content "Cases.xlsx": <http://links.lww.com/MD/G383>).

3. Results

The number of patients, age, and sex characteristics was shown in Table 1. Age distribution was evaluated in 5 categories and included in Table 2 (Fig. 1).

The total number of patients admitted to our clinic because of orthopedic trauma in the pre-covid period was 629 (38.1%), those in the restriction period was 334 (20.2%), and those in the permitted period was 688 (41.7%) (Table 3, Fig. 2).

There was a significant difference between admission dates and the number of patients ($P < .001$). A significant difference was found between the hospital admission dates of the patients and their sex ($P = .004$). A significant difference was found between the age distribution of the patients and the groups ($P = .036$). In addition, we found a significant difference between the mean age of the patients and the dates of hospital admission ($P = .039$).

4. Discussion

The Covid-19 pandemic caused by the Coronavirus-2 of severe acute respiratory syndrome is still affecting countries and healthcare systems worldwide.^[5] Turkey is one country that efforts to decrease the devastating effects like many other countries. Like closing schools and workplaces, some public health measures were implemented, and people were scared to go out. We aimed to detect if outdoor injuries would be decreased and caused changes in the injury pattern in a rural area. Our hospital, located in a rural region of the country, is the only hospital dealing with Covid-19 pandemic and orthopedic trauma patients in its local geographical area. Because of these facts, we evaluated orthopedic trauma patients epidemiologically to present our results in rural, whether there would be a decrease in the number of trauma cases or not.

In their study, Leung et al^[6] stated that the number of hospital admissions for fracture treatment of upper and lower limbs is decreased because of preventive measures and "stay at home" initiatives. They also stated that mobility restriction could affect fracture risk because of reduced outdoor injuries. Kalantar et al^[7] reported that in March 2020, the number of patients referred to

Table 1
Demographical characteristics of patients who were admitted to our clinic.

	Pre-covid period	Restriction period	Permitted period	Total	P-value
Number of patients	629 (38.1%)	334 (20.2%)	688 (41.7%)	1651 (100.0%)	<.001*
Gender					
F	227 (36.10%)	138 (41.30%)	214 (31.10%)	579 (35.10%)	.004**
M	402 (63.90%)	196 (58.70%)	474 (68.90%)	1072 (65.90%)	
Age	26.35 ± 21.00 (range: 0–91)	25.62 ± 20.25 (range: 0–91)	23.89 ± 19.23 (range: 0–97)	25.18 ± 19.73 (range: 0–97)	.039**

F = female, M = male.

* Student's *t* test.

** Analysis of variance.

Statistically significant has been demonstrated.

Table 2
Periodic distribution of orthopedic trauma by age groups.

Age groups	Pre-covid period	Restriction period	Permitted period	Total	P-value
Pre-school (0–5 years)	71 (4.3%)	50 (3.0%)	98 (5.9%)	219 (13.3%)	<.001*
School (6–17 years)	199 (12.1%)	103 (6.2%)	239 (14.5%)	541 (32.8%)	<.001*
Young-adult (18–39 years)	202 (12.2%)	109 (6.6%)	205 (12.4%)	516 (31.3%)	<.001*
Middle-aged (40–64 years)	120 (7.3%)	57 (3.5%)	119 (7.2%)	296 (17.9%)	<.001*
Elderly (65–97 years)	37 (2.2%)	15 (0.9%)	27 (1.6%)	79 (4.8%)	<.001*
Total	629 (38.1%)	334 (20.2%)	688 (41.7%)	1651 (100.0%)	<.001*

* Student's *t* test.

** Analysis of variance.

Statistically significant has been demonstrated.

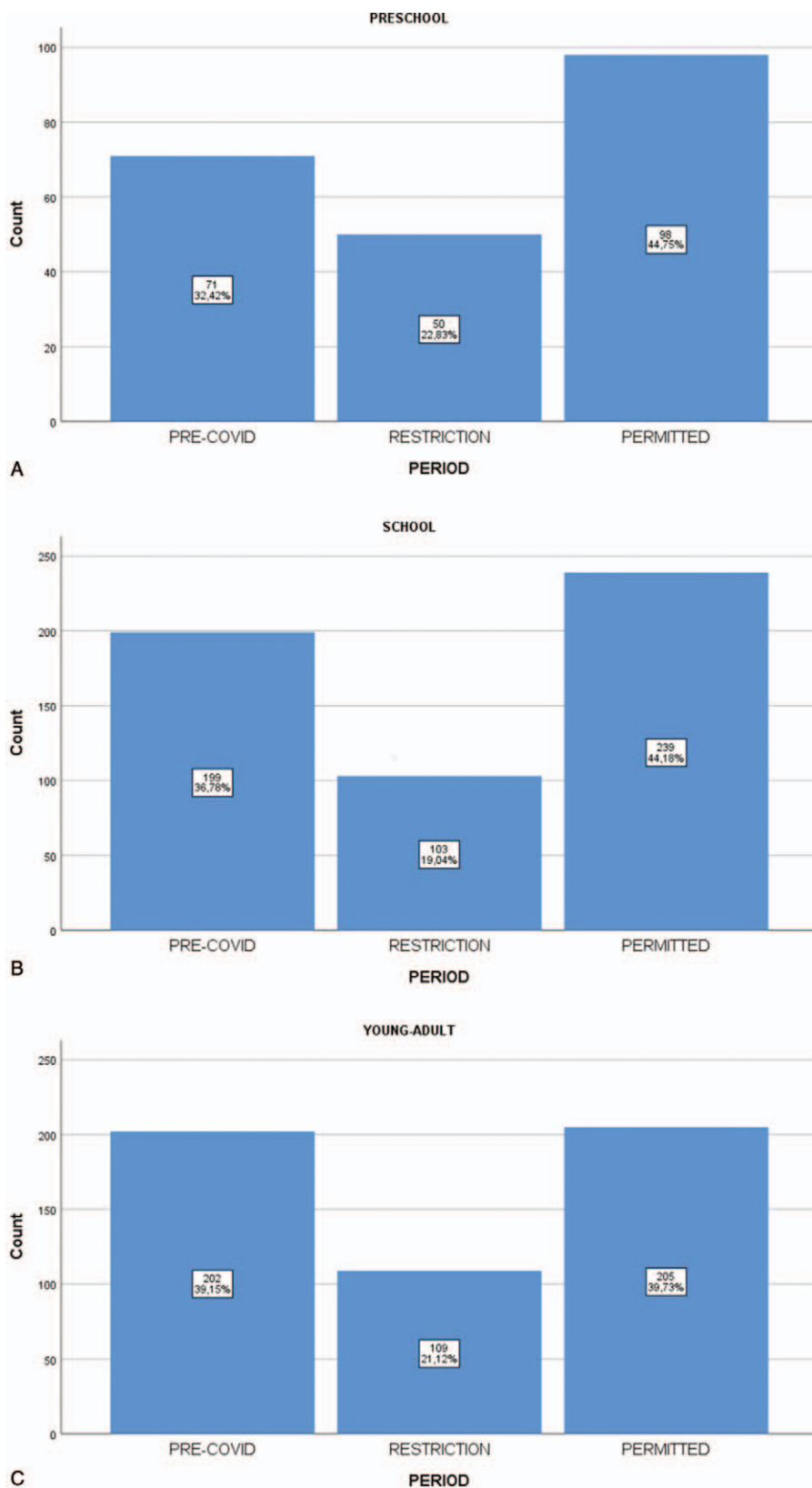


Figure 1. Periodic distribution of orthopedic trauma by age groups. The admission rates of the preschool age group in different periods because of orthopedic trauma (A). The admission rates of the school-age group in different periods because of orthopedic trauma (B). The admission rates of young-adult age group in different periods because of orthopedic trauma (C). The admission rates of middle-aged age group in different periods because of orthopedic trauma (D). The admission rates of the elderly age group in different periods because of orthopedic trauma (E).

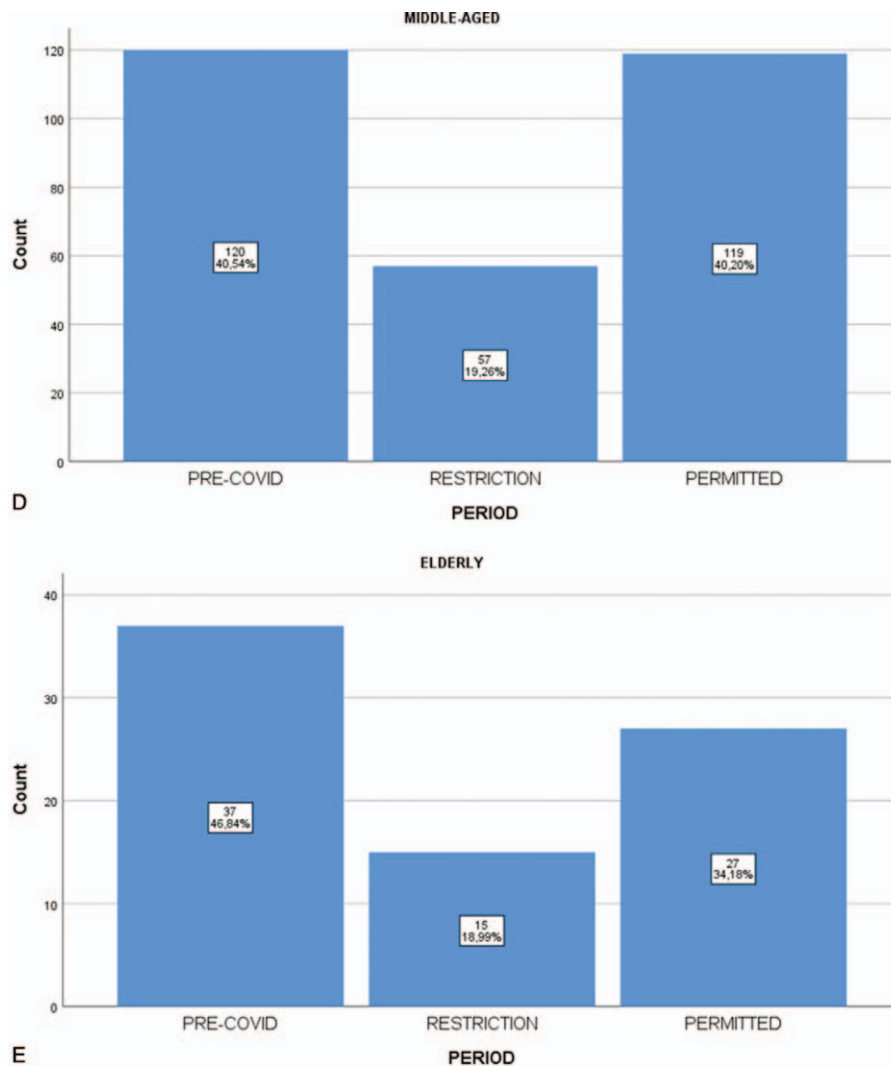


Figure 1. Continued.

the emergency department had decreased significantly, and the number of orthopedic surgeries was close to zero. We found that the number of patients who applied to the orthopedics and traumatology outpatient clinic with a history of trauma decreased. Also, admissions for orthopedic fractures that need surgery were reduced in our hospital. We thought this reduction in number was the preventive measures and fear of people for these highly contagious diseases. These were some reasons for late admissions and increasing complication rates that we did not

evaluate in this study for some fractures that needed reduction or surgery.

Iranian researchers assessed 628 patients (482 men and 158 women) with a mean age of 39 (range 1–96) years in 2 different orthopedic clinics.^[8] We studied a total of 1651 patients (1072 men and 579 women) at 3 different times. In our study, the mean age of the 3 groups was 25.18 ± 19.73 , which is a younger population.

We found the fractures of the upper extremities were the most common fracture type when we compared 3 different periods. In

Table 3

Periodic distribution of orthopedic traumas by fracture region.

Fracture region	Pre-covid period	Restriction period	Permitted period	Total	P-value	
Upper extremity	442 (26.8%)	258 (15.6%)	503 (30.5%)	1203 (72.9%)	<.001*	.024**
Lower extremity	155 (9.4%)	69 (4.2%)	159 (9.6%)	383 (23.2%)	<.001*	
Axial skeleton + Pelvic ring	32 (1.9%)	7 (0.4%)	26 (1.6%)	65 (3.9%)	<.001*	
Total	629 (38.1%)	334 (20.2%)	688 (41.7%)	1651 (100.0%)	<.001*	

* Student's *t* test.

** Analysis of variance.

Statistically significant has been demonstrated.

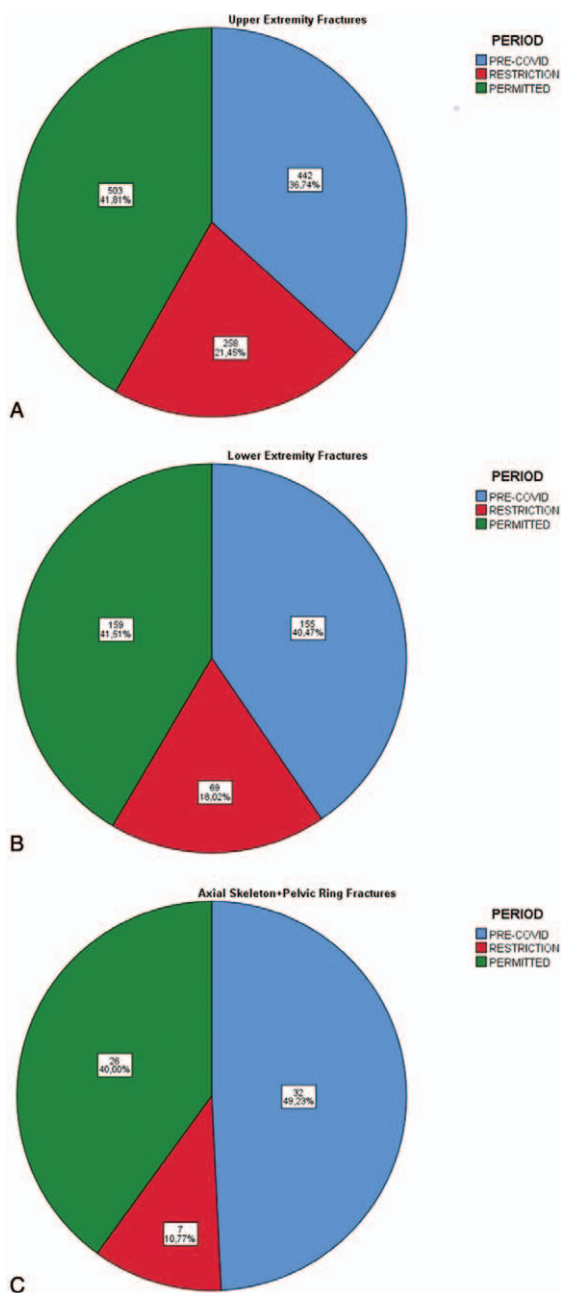


Figure 2. Periodic distribution of orthopedic traumas by fracture region. The admission rates of patients with upper extremity fractures at different periods (A). The admission rates of patients with lower extremity fractures at different periods (B). The admission rates of patients with axial skeleton and pelvic ring fractures at different periods (C).

recent research, Wong and Cheung^[9] discovered a reduction in patients who suffered from orthopedic trauma. Hip fractures, followed by thoracolumbar fractures, were the most prevalent fracture forms found in the elderly, according to Zhu et al.^[10] In a multicenter study from China, researchers evaluated epidemic and control groups, and they found femur fractures were most common in the Covid-19 group, followed by cruris fractures. They also reported that femur fractures were the most common in the control group, followed by hand and foot fractures.^[11] Our study detected a decrease in the number of orthopedic trauma

patients during the restriction period. This result was consistent with the literature. Slullitel et al^[12] reported that the activities of elderly individuals slow down, and their life satisfaction decreases. They also noted that implant selection was also affected because of a high mortality rate in older individuals. We predicted hip fractures and distal radial fractures to be more common in older individuals. However, in our study, the elderly was the age group with the lowest fracture rate, with 79 patients (4.8%).

We noticed a reduction in patients who had a history of trauma admitted to the outpatient clinics and emergency departments due to “stay at home” campaigns and particular precautions for the pediatric population in Turkey. During the Covid-19 pandemic, researchers studied the prevalence of juvenile fractures and discovered a significant decrease in lower extremity fractures needing surgery.^[13] The pediatric fracture volume has decreased 2.5-fold during the Covid-19 pandemic, according to Raitio et al.^[14] They also stated that the reason was the cessation of organized sports and decreased playground use. Because our research was retrospective, we could not classify trauma mechanisms. However, our hospital is already in a rural area, and the number of pediatric populations treated by other methods at home would not be underestimated before the Covid-19 pandemic. Despite this, we observed a reduction in the number of children admitted to the hospital because of trauma. These results were also consistent with literature.

4.1. Limitations

This research had a few limitations. Essentially, the hospital is placed in a local geographical area, limiting this research to the general population. Seasonal differences changed fracture patterns, and we did not account for seasonal differences. An additional restriction was that the data were collected using an institutional hospital medical database; few injuries or fractures were overlooked. Furthermore, some fractures might be coded incorrectly because the data entries were made by 6 different doctors and 3 different secretaries. In addition, we could not determine the mechanism of trauma. The results would improve if the data of more centers were analyzed.

5. Conclusion

In this study, we found a decrease in the number of orthopedic trauma patients with upper and lower extremity and axial and pelvis fractures on the restriction period compared with the pre-covid and the permitted periods during the Covid-19 pandemic in the rural area of Turkey. Public health precautions imposed by the authorities because of the Covid-19 outbreak reduced the spread of the epidemic and helped reduce the incidence of orthopedic trauma. Compliance with restrictions also helped lower hospital occupancy rates.

Author contributions

- Conceptualization:** Serdar Toy, Oktay Polat.
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- Formal analysis:** Serdar Toy, Hakan Özbay.
- Investigation:** Oktay Polat, Serdar Toy.
- Methodology:** Oktay Polat, Hakan Özbay, Serdar Toy.
- Project administration:** Serdar Toy, Oktay Polat, Hakan Özbay.
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Visualization: Serdar Toy.

Writing – original draft: Serdar Toy, Oktay Polat, Hakan Özbay.

Writing – review & editing: Serdar Toy, Oktay Polat, Hakan Özbay.

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