

# Effect of COVID-19 pandemic on fracture demographics at tertiary care hospital in India

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## Abstract

**Background:** Due to nationwide lockdown, outdoor mobility has decreased significantly. The purpose of this study was to evaluate the types and incidence of fractures treated during the pandemic and compare them with the same time period without pandemic, in order to shed light on the situations that should be prepared for orthopedic trauma surgeons in extraordinary situations that may be seen in the future. **Material and Methods:** Present study was single-center, retrospective, comparative study, conducted in patients who were admitted to the hospital with a new fracture between the time period of March 22 to 30th September 2019 (non-pandemic period) to March 22nd to 30th September 2020 (pandemic period). **Results:** A total of 416 and 230 fractures were observed in 2019 and 2020, respectively. Significant decrease in number of cases by 10% in April, 2020 among total number of cases when compared to previous year. There was increase in number of cases by 5% in September 2020 among total cases when compared to previous year. Paediatric trauma is decreased by 4% in pandemic year. Mean age was more in year 2019 (46.33 years) as compared to year 2020 (25.67 years). Age group with maximum number of cases in year 2019 was 61-70 year (18.9%), Age group with maximum number of cases in year 2020 was 51-60 year (17.39%). Upper limb trauma decreased by 7% and Lower limb trauma incidence is same as previous year. In present study we noted that, in years 2019 intertrochanteric fracture increased by 3%, neck of femur fracture decreased by 4%, fracture radius decreased by 5%, spine fracture increased by 4%, fracture shaft femur decreased by 5%, fractures of foot increased by 2%. periprosthetic fracture increased by 3% in this pandemic year. **Conclusion:** During nationwide lockdown outdoor mobility has decreased significantly. Impact of the COVID-19 pandemic on fracture incidence and characteristics was noted as decrease in overall fracture incidence, paediatric fractures and upper limb fracture incidence.

**Keywords:** COVID-19 pandemic, fracture demographics, paediatric fractures, RTA

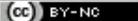
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## INTRODUCTION

Worldwide traumatic injuries pose a significant and increasing challenge to healthcare systems.<sup>1</sup> Injuries that

cause damage to the musculoskeletal system, which includes bones, ligaments, joints, tendons, muscles, and nerves, are defined as orthopedic injuries.<sup>2</sup> A huge number of traumatic injuries are orthopedic in nature, fractures being the most common injury. Furthermore, studies noted that orthopedic injuries predominantly affect younger male adult.<sup>3,4</sup> With a prevalence of 63.6% and 39.1% studies have shown that Road Traffic Accidents (RTAs) are the most common determinant of traumatic orthopedic injuries.<sup>4,5</sup> With a prevalence of 21.8% and 35.1% studies have shown that falls are the second most common determinant of traumatic orthopedic injuries.<sup>4,5</sup> We hypothesized that the incidence of fractures would be decreased in every part of the body during the period of COVID 19 pandemic. Nationwide lockdown was imposed

on 22nd march,2020.<sup>6</sup> As a result of all these measures, outdoor mobility has decreased significantly. The purpose of this study was to evaluate the types and incidence of fractures treated during the pandemic and compare them with the same time period without pandemic, in order to shed light on the situations that should be prepared for orthopedic trauma surgeons in extraordinary situations that may be seen in the future.

### MATERIAL AND METHODS

Present study was single-center, retrospective, comparative study, conducted in Department of Orthopedic Surgery at Max Superspeciality Hospital, Vaishali, Ghaziabad, India. Patients who were admitted to the hospital with a new fracture between the time period of 22nd March and 22nd September in 2019 and 22nd March and 22nd September 2020 (Pandemic period) were considered for present study. Study was approved by institutional ethical committee.

#### Inclusion criteria:

Patients who were admitted to the hospital with a new fracture between the time period of March 22 to 30th September 2019 (non-pandemic period) to March 22nd to 30th September 2020 (pandemic period).

#### Exclusion criteria:

1. Patients with a diagnosis other than fracture, re-admissions with the same fracture, patients mistakenly coded with a diagnosis of fracture
2. Any patient with a postoperative complication arising in the period prior to the data collection were excluded
3. With respect to infections, all acute and chronic surgical site infections (SSI) and non-SSIs were excluded from the final analysis.
4. All Routine elective orthopaedic cases and non-urgent semi-elective procedures

Patients who were admitted and examined by orthopedic surgeons in both emergency departments and outpatient clinics were sought from the hospital's digital archive.

Age, gender, and fracture areas were recorded. Patients who were hospitalized, operated due to a fracture were scanned from the clinical archive and their length of hospital stays and time to operations were noted. Data was collected, compiled and analysed using Microsoft Excel. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables. Statistical analysis was done using descriptive statistics.

### RESULTS

A total of 416 and 230 fractures were observed in 2019 and 2020, respectively. Significant decrease in number of cases by 10% in April,2020 among total number of cases when

compared to previous year. There was increase in number of cases by 5% in September 2020 among total cases when compared to previous year.

**Table 1: Month wise distribution**

Month	2019	2020
March	61 (15%)	50 (22%)
April	57 (14%)	11 (5%)
May	49 (11%)	30 (13%)
June	61 (15%)	23 (10%)
July	63 (15%)	34 (14%)
August	64 (16%)	37 (16%)
September	60 (15%)	45 (20%)
<b>Total</b>	<b>416</b>	<b>230</b>

Paediatric trauma is decreased by 4% in pandemic year. Mean age was more in year 2019 (46.33 years) as compared to year 2020 (25.67 years). Age group with maximum number of cases in year 2019 was 61-70 year (18.9%), Age group with maximum number of cases in year 2020 was 51-60 year(17.39%).

**Table 2: General characteristics**

Characteristic	2019	2020
Total	416	230
Paediatric trauma	49 (11.7%)	18 (7.7%)
Mean age (years)	46.33	25.67
61-70 years	79 (18.9%)	
51-60 years		40 (17.39%)

Upper limb trauma decreased by 7% and Lower limb trauma incidence is same as previous year.

**Table 3: Fracture site wise distribution**

Fracture site	2019 (n=416)	2020 (n=230)
Upper limb	179 (43%)	83 (36%)
Lower limb	216 (52%)	120 (52%)
Spine	12 (3%)	15 (7%)
Miscellaneous	9 (2%)	12 (5%)
<b>Total</b>	<b>416</b>	<b>230</b>

In present study we noted that, in years 2020 intertrochanteric fracture increased by 3%, neck of femur fracture decreased by 4%, fracture radius decreased by 5%,spine fracture increased by 4%,fracture shaft femur decreased by 5%,fractures of foot increased by 2%. periprosthetic fracture increased by 3% in this pandemic year.

**Table 4: Detailed fracture site distribution**

	2019 (n=416)	2020 (n=230)
Upper limb	179 (43%)	83 (36%)
Clavicle	12 (3%)	4(1.7%)
Humerus	41 (10%)	23 (10%)
Radius	56 (13%)	20(8.6%)
Ulna	28 (7%)	9 (4%)
Hand	23 (5%)	12 (5%)
Elbow	19 (5%)	15 (6.5%)
Lower limb	216 (52%)	120 (52%)
Acetabulum	4 (1%)	0
Hip	94 (23%)	51 (22.5%)

Femur	34 (10%)	11 (4.7%)
Patella	5 (1%)	5 (2%)
Tibia	40 (9%)	23 (10%)
Fibula	(1%)	6 (2.6%)
Ankle	(5%)	15 (6.5%)
Foot	(2%)	9 (3.9%)
Spine	12 (3%)	15 (7%)
Miscellaneous	9 (2%)	12 (5%)
Dislocation	4	2
Periprosthetic fractures	1	6
Amputation	2	1
Tendoachilles tear	2	3

## DISCUSSION

During the COVID-19 pandemic, public health measures of complete lockdown and various stages of unlocking was imposed to encourage social distancing. It included cancellation of school, colleges and organized sports. Only essential services were allowed leading to great reduction in outdoor movement of population. A resulting change in fracture epidemiology is expected. Shiva Prasad SS studied pattern of Orthopaedic injuries over 1 year, maximum (n=1232, 70.27 percent) were in the age group of 11-45 years. There were 1286 males (73.35 percent) and 467 (26.64 percent) females patients. Road traffic accident was the most common cause of injuries (61.03 %), other causes were fall from height (17.22%), assault (9.18%).<sup>7</sup> Pei Yu *et al.*, noted that from January 24 to March 9 in 2020, 112 orthopedic patients were admitted to the department of orthopedics, while there were 196 orthopedic patients admitted in the same period in 2019, yielding a 42% decrease in admission. There were 33.7% patients with femur fracture in 2019, and 45.5% patients in 2020, indicating femur fracture was the top type of fracture in both years. Characteristics of orthopedic cases in the epidemic period was upper arm(8%), forearm (15.2%), thigh(33.7%), lower leg(18.8%), vertebra(5.4%), pelvis and acetabulum(0.0%),hand(1.8%),foot(5.4%).<sup>8</sup>

Similar findings were noted in present study. In a study by Hongzhi Lv *et al.*, studied 2,489 patients. In the epidemic group, there were 865 patients, including 483 (55.8%) males and 382 (44.2%) females with an average age of  $53.1 \pm 23.1$  years. In the control group, there were 1,624 patients, including 876 (53.9%) males and 748 (46.1%) females with an average age of  $51.2 \pm 21.5$  years. Patients in the epidemic group was significantly older than those in the control group (p 0.045). For epidemic group, the mostly commonly involved age group was elderly patients, whereas it was middle-aged adults for the control group (p 0.002). The proportion rates of low energy injuries (79.1%), osteoporotic fractures (32.5%) and closed fractures (94.5%) in the epidemic group were significantly higher when compared to the control group, respectively (34.4%, 26.9% and 91.9%; all p<0.05). The proportion

rates of Gustilo-Anderson classification (5.5%), concurrent fractures (2.3%), and injury severity score ( $15.6 \pm 6.7$ ) in epidemic group were significantly lower than those in the control group, respectively (52.8%, 3.9% and  $20.1 \pm 8.7$ ; all P<0.05).<sup>9</sup> According to study of LeBrun DG, *et al.* in hip fracture patients with concomitant COVID-19 infection had worse American Society of Anesthesiologists' scores but similar baseline comorbidities with significantly higher rates of inpatient mortality compared with those without concomitant COVID-19 infection.<sup>10</sup> Egol KA *et al.*, from NYU COVID Hip Fracture Research Group suggested COVID-19 had a devastating effect on the care of patients with hip fracture during the pandemic. Although practice patterns generally remained unchanged, treating physicians need to understand the increased morbidity and mortality in patients with hip fracture complicated by COVID-19.<sup>11</sup> Michael Anthonius *et al.* studied 984 participants. The pooled prevalence of COVID-19 was 9%, while mortality rate in patients with concomitant hip fracture and COVID-19 was found to be 36%, whereas the mortality rate in hip fracture without COVID-19 was 2%. Metaanalysis showed that COVID-19 was associated with a seven-fold increase in risk of mortality in patients with hip fracture.<sup>12</sup> Traumatic injuries are one of the main causes of mortality in the world, with 90% of the injuries estimated to occur in low and middle-income countries according to the World Health Organization (WHO).<sup>13</sup> Though incidence of fractures is reduced, still more care is required in elderly, comorbid patients with multiple fractures.

## CONCLUSION

During nationwide lockdown outdoor mobility has decreased significantly. Impact of the COVID-19 pandemic on fracture incidence and characteristics was noted as decrease in overall fracture incidence, paediatric fractures and upper limb fracture incidence.

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