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Epidemiological pattern of orthopaedic fracture during the COVID-19 pandemic: A systematic review and meta-analysis

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ABSTRACT

Introduction: This systematic review and meta-analysis aimed evaluate the 30-day mortality, number and site of fracture, mechanism of injury, and location where injury was sustained during the pandemic compared to pre-pandemic.

Methods: We performed a systematic literature search from PubMed and Embase on original articles, research letters, and short reports which have data about the number of fractures, site of fracture, mechanism of injury, location where injury was sustained, percentage of operative intervention, mortality during the pandemic compared to a specified period of time before the pandemic. The search was finalized in October 14, 2020.

Results: A total of 11,936 participants from 16 studies were included in our study. The pooled analysis indicated a higher 30-days mortality associated with fractures during the pandemic (9% vs 4%, OR 1.86 [1.05, 3.27], $p = 0.03$; I^2: 36%, $p = 0.15$). The number of fractures presenting to hospitals has declined 43% (35–50%) compared to pre-pandemic. Hand fracture was fewer during the pandemic (18% vs 23%, OR 0.75 [0.58, 0.97], $p = 0.03$; I^2: 69%, $p = 0.002$). Work-related traumas, high-energy falls, and domestic accidents were more common during the pandemic, while sports-related traumas were found to be less. Injuries that occurred in the sports area were lower than before the pandemic.

Conclusion: The present meta-analysis showed that during the COVID-19 pandemic, the number of fractures has decreased, but there is a higher mortality rate associated with fractures.

Trial registration

This study was registered with PROSPERO on October 16, 2020. The registration number is CRD42020214413. Available from https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020214413.

1. Introduction

The rapidly spreading Coronavirus Disease 2019 (COVID-19) continues to burden healthcare providers around the world and stretch their capacity in providing medical services to the limit. The prioritization of COVID-19 cases, avoidance of medical visits and follow-up, and temporary postponement of elective procedures place certain individuals at a higher risk of developing short-term exacerbation or long-term complications.[1,2] People with advanced age, excessive body mass index (BMI), and comorbidities, including diabetes mellitus, hypertension, chronic obstructive pulmonary disease, cerebrovascular disease, heart disease, and chronic kidney disease, are associated with increased severity and mortality if contracting COVID-19.[3–12]

Since the beginning of COVID-19 epidemic, the incidence of orthopaedic trauma admission has declined substantially given the widespread implementation of self-isolation, quarantine, lockdown, and travel restrictions.[13–16] People are urged to stay at home and only seek medical services if they experience a medical emergency. Reduction on public mobility and outdoor activities contributed to the decrease in motor vehicle accidents, sport-related traumas, and work-related traumas. However, some individuals still suffered injuries while living or wandering around home, ranging from children who knocked, stabbed, or fell while playing to elderly who fell during their daily activities.[17,18]

The new standard of living in the COVID-19 era has had a

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seriously impact on the epidemiology and prevalence of orthopaedic trauma cases, including fracture. The aim of this systematic review and meta-analysis was to evaluate the 30-day mortality, number and site of fracture, mechanism of injury, and location where injury was sustained during the pandemic compared to pre-pandemic.

2. Methods

2.1. Search strategy

We performed a systematic literature search from PubMed and Embase using the keyword ((pandemic) OR (covid-19)) AND ((Fracture) OR (Ununited)), the search was finalized in October 14, 2020. Two independent researchers performed the initial search, and the resulting discrepancies were solved by discussion. Inclusion and exclusion criteria were then applied to the retrieved records.

Inclusion and Exclusion Criteria.

Original articles, research letters, and short reports were included. The data of interest were the number of fractures, site of fracture, mechanism of injury, location where injury was sustained, percentage of operative intervention, mortality during the pandemic compared to previous historical control. Historical control was defined as a specified period of time before the pandemic. We exclude pre-prints, case reports/series, review articles, commentaries/editorial, and articles in non-English language.

2.2. Data extraction

Two authors performed data extraction and quality assessment independently using extraction forms. The form contains author, study design, year, location, sample size, the study period for both pandemic group and comparator, age, gender, and the outcome of interests.

2.3. Risk of bias assessment

The risk of bias assessment of the included studies was performed by two independent authors. The quality of the observational studies was assessed using the Newcastle-Ottawa Score and the discrepancies were resolved via discussion.

2.4. Outcomes and measures of effect

The main outcome was 30-day mortality during the pandemic compared to comparator group. The pooled estimate will be reported in odds ratio (OR).

The secondary outcome was number, site of fracture, mechanism of injury, and location where injury was sustained. Number of fractures sustained during the pandemic compared to comparator group. Site of fracture includes scapula, clavicle, humerus, radius and ulna, carpus and hand, spine, pelvic and acetabulum, femur, tibia and fibula, foot and ankle. The mechanism of injury consists of sports-related, work-related, motor vehicle accident, low-energy fall, high-energy fall, domestic accident, and others. The location of the injury was consisted of home, public (community, street), school or daycare or residential care, sports area, playground, and not reported. Other details of interest were number of open fractures, mean time to surgery, and non-operative/operative management. The variables were reported in percentages and ORs.

2.5. Statistical analysis

STATA 16.0 (StataCorp 2019 LLC) and ReviewManager 5.3 (Cochrane Collaboration) were used to perform meta-analysis. To calculate the percentages of change or the proportion of a specified variable (i.e. location of fracture), we conduct meta-analysis of proportion.

The ORs for site of fracture, mechanism of injury, location of injury, non-operative/operative management, and 30-day mortality were calculated using Mantel-Haenszel method with random-effects model regardless of heterogeneity. We use I^2 statistics and Cochran's Q test to evaluate inter-study heterogeneity, which is deemed to be significant if I^2 >50% or $p < 0.10$.

3. Results

3.1. Study selection and characteristics

There were a total of 11,936 subjects from 16 studies included in the qualitative and quantitative synthesis. Characteristics of the included studies are presented in Table 1. The summary of meta-analysis is displayed in Table 2 (see Fig. 1).

3.2. 30-Days mortality

The number of mortality was higher during the pandemic (9% vs 4%, OR 1.86 [1.05, 3.27], $p = 0.03$; I^2: 36%, $p = 0.15$) [Fig. 2]. The number of fractures and operative management for the injuries during the pandemic did not differ significantly compared to pre-pandemic [Table 2, Table 4].

3.3. Number of fractures

The number of fractures declined by 43% (35–50%) during the pandemic compared to pre-pandemic.

3.4. Fracture sites

Hand fracture was fewer during the pandemic (18% vs 23%, OR 0.75 [0.58, 0.97], $p = 0.03$; I^2: 69%, $p = 0.002$) [Fig. 3]. A borderline statistical significance increase in number of femoral fractures were observed during the pandemic (18% vs 15%, OR 1.32 [0.99, 1.75], $p = 0.06$; I^2: 73%, $p = 0.001$). The proportion of scapular, clavicular, humeral, radial and ulnar, spinal, pelvic and acetabular, tibia and fibular, foot and ankle fractures were similar during the pandemic and pre-pandemic period [Table 2, Table 3].

3.5. Mechanism of injuries

Sports-related injuries were less frequent in the pandemic (5% vs 13%, OR 0.32 [0.16, 0.66], $p = 0.002$; I^2: 89%, $p < 0.001$). The number of work-related injuries (16% vs 7%, OR 1.84 [1.31, 2.59], $p < 0.001$; I^2: 21%, $p = 0.28$), high-energy fall (18% vs 12%, OR 1.55 [1.02, 2.36], $p = 0.04$; I^2: 63%, $p = 0.07$), and domestic accidents (41% vs 24%, OR 2.12 [1.05, 4.29], $p = 0.04$; I^2: 94%, $p < 0.001$) were significantly higher during the pandemic [Table 2].

3.6. Location of injuries

Injuries sustained in sports area are were less frequent during the pandemic (4% vs 15%, OR 0.36 [0.16, 0.79], $p = 0.01$; I^2: 81%, $p = 0.006$). The percentage of injury sustained in home (68% vs 39%, OR 3.96 [0.95, 16.61], $p = 0.06$; I^2: 98%, $p < 0.001$) during the pandemic was higher, but only reach a borderline statistical significance. Injuries sustained in public area, school, daycare or residential care were similar during pandemic and pre-pandemic [Table 2].

Table 1
Characteristics of the included studies.

First Author	Study Design	Location	Sample size (pandemic vs control)	Pandemic Period	Control Period	Age (mean or median [years])	Male (%)	Newcastle Ottawa Scale
Andrea 2020	Single Center; Retrospective, Observational	Florence, Italy	120 vs 168	February 1 to March 31, year 2020	February 1 to March 31, year 2019	N/A	63.2 vs 60.7	8
Arafa 2020	Single Center; Retrospective, Observational	Luton, UK; NHS hospital trust	97 vs 60	March 1 to May 31, year 2020	March 1 to May 31, year 2019	83.67 ± 7.72 vs 83.33 ± 8.28	30.9 vs 31.7	9
Bram 2020	Single Center; Retrospective, Observational	Philadelphia, US; level 1 pediatric trauma hospital	306 vs 719.5	March 15 to April 15, year 2020	March 15 to April 15, year 2018 and 2019 (mean)	7.5 ± 4.3 vs 9.4 ± 4.4	52.0 vs 57.6	8
Dhillon 2020	Single Center; Retrospective, Observational	Chandigarh, India; tertiary trauma hospital	263 vs 611	March 25 to May 31, year 2020	March 25 to May 31, year 2019	N/A	81.4 vs 82.6	8
Giuntoli 2020	Single Center; Retrospective, Observational	Tuscany, Italy; main hospital center	143 vs 319	March 1 to 31, year 2020	March 1 to 31, year 2019	62.7 vs 61.3	50.0 vs 50.6	8
Gumina 2020	Single Center; Retrospective, Observational	Rome, Italy	22 vs 41	March 8 to April 8, year 2020	March 8 to April 8, year 2019	63.3 vs 47.9	61.0 vs 40.9	8
Hernigou 2020	Single Center; Retrospective, Observational	Hornu, Belgium	152 vs 132	March 1 to April 15, year 2020	March 1 to April 15, year 2018	45.5 vs 61	36.2 vs 39.5	9
Lv 2020	Multi Center; Retrospective, Observational	China (National); 8 tertiary referral hospitals and 3 secondary referral hospitals	865 vs 1624	January 20 to February 19, year 2020	January 20 to February 19, year 2019	53.1 ± 23.1 vs 51.2 ± 21.5	55.8 vs 53.9	9
Macey 2020	Single Center; Retrospective, Observational	Glasgow, UK; NHS Greater Glasgow	76 vs 76	March 20 to April 25, year 2020	March 20 to April 25, year 2019	83 vs 83	69.9 vs 69.9	9
Malik-Tabassum 2020	Single Center; Retrospective, Observational	Hastings, UK; NHS hospital trust	68 vs 87	March 23 to May 11, year 2020	March 23 to May 11, year 2018 and 2019 (mean)	84.3 ± 8.9 vs 83.3 ± 8.9	36.8 vs 21.3	8
Maniscalo 2020	Multi Center; Retrospective, Observational	Piacenza and Parma, Italy	121 vs 169	February 22 to April 18, year 2020	February 22 to April 18, year 2019	81.7 ± 9.7 vs 81.1 ± 10.7	26.4 vs 36.7	7
Nabian 2020	Single Center; Retrospective, Observational	Kermanshah, Iran; tertiary trauma hospital	117 vs 247	March 1 to April 15, year 2020	March 1 to April 15, year 2018 and 2019 (mean)	9.98 ± 5.50 vs 9.87 ± 5.27	72.5 vs 70.5	8
Nuñez 2020	Single Center; Retrospective, Observational	Barcelona, Spain; tertiary trauma hospital	36 vs 42	March 14 to April 2, year 2020	February 23 to March 13, year 2020; March 16 to April 4, year 2019; March 17 to April 5, year 2018 (mean)	88.4 ± 9.2 vs 86.3 ± 6.8	50.9 vs 46.6	8
Reddy 2020	Multi Center; Retrospective, Observational	Telangana, India; 8 teaching hospitals, 8 corporate hospitals, 1 dedicated industrial trauma, and hand injury center	754 vs 2020	March 25 to April 25, year 2020	February 23 to March 24, year 2020	N/A	69.2 vs 77.0	8
Slullitel 2020	Single Center; Retrospective, Observational	Buenos Aires, Argentina; tertiary care hospital	74 vs 86	December 1, year 2019 to March 18, year 2020	March 19, year 2020 to May 31, year 2020	86 vs 86	12.2 vs 22.1	9
Turgut 2020	Single Center; Retrospective, Observational	Izmir, Turkey; tertiary care hospital	645 vs 1675.5	March 16 to May 22, year 2020	March 16 to May 22, year 2018 and 2019 (mean)	25.25 ± 23.58 vs 24.71 ± 22.13	60.7 vs 60.8	8

*compares pandemic group vs control group.
**sample size represents the number of fracture cases.
NA: Not Available/Not Reported/Reported in different classification.

4. Discussion

In this systematic review and meta-analysis, we gathered information regarding the epidemiology and prevalence of orthopaedic trauma cases with an emphasis on fractures occurring during the COVID-19 pandemic and compared them to the pre-pandemic (control) situation. Pooled analysis indicated a higher 30-days mortality associated with fractures during the pandemic. The number of fractures presenting to hospitals has declined compared to pre-pandemic. Hand fractures, work-related traumas, high-energy falls, and domestic accidents were more frequent during the pandemic. Meanwhile, sports-related injuries decreased during the pandemic. In addition, injuries sustained in sports area were lower during the pandemic.

Overall, the number of fractures decreased sharply in all[13,17,19–31] but one[32] of the included studies. Although the total number of fractures was reduced by 43% (35–50%) during the pandemic, we found that the proportion hand fractures was lower (significant), the proportion of femur fractures was higher (borderline significance), whereas the proportion of fractures at other locations was relatively constant. The proportion of femoral fractures reported during the pandemic was 32% greater than in the pre-pandemic period. Injuries that occur in the home, residential care, or hospital setting contribute to the incidence of proximal femur (hip) fractures regardless of the period.[25] Even though the number of major trauma reduced during the epidemic, the rate of

Table 2
Results of meta-analyses.

	Odds Ratio	Heterogeneity	Percentage	Studies
Mortality	1.86 [1.05, 3.27], p = 0.03	36%, p = 0.15	9 vs 4	7
Open Fracture	0.70 [0.40, 1.21], p = 0.20	84%, p < 0.001	13 vs 18	6
Operative Management	0.60 [0.34, 1.04], p = 0.07	91%, p < 0.001	63 vs 64	10
Site				
Scapula	0.67 [0.18, 2.47], p = 0.55	0%, p = 0.66	–	3
Clavicle	0.91 [0.68, 1.23], p = 0.55	0%, p = 0.44	3 vs 3	6
Humerus	1.22 [0.93, 1.59], p = 0.15	61%, p = 0.01	14 vs 11	8
Radius and Ulna	1.05 [0.76, 1.45], p = 0.75	84%, p < 0.001	23 vs 22	8
Carpus and Hand	0.75 [0.58, 0.97], p = 0.03	69%, p = 0.002	18 vs 23	8
Spine	0.83 [0.65, 1.06], p = 0.14	0%, p = 0.66	2 vs 2	3
Pelvic and Acetabulum	0.78 [0.45, 1.36], p = 0.39	43%, p = 0.15	2 vs 2	4
Femur	1.32 [0.99, 1.75], p = 0.06	73%, p = 0.001	18 vs 15	7
Tibia and Fibula	0.97 [0.72, 1.30], p = 0.83	73%, p = 0.001	11 vs 11	7
Foot and Ankle	0.90 [0.77, 1.05], p = 0.17	19%, p = 0.29	12 vs 14	7
Mechanism of Injury				
Sports-related	0.32 [0.16, 0.66], p = 0.002	89%, p < 0.001	5 vs 13	6
Work-related	1.84 [1.31, 2.59], p < 0.001	21%, p = 0.28	16 vs 7	4
Motor Vehicle Accidents	0.50 [0.23, 1.07], p = 0.09	98%, p < 0.001	20 vs 33	8
Low-energy Fall	2.16 [0.96, 4.84], p = 0.06	98%, p < 0.001	39 vs 25	6
High-energy Fall	1.55 [1.02, 2.36], p = 0.04	63%, p = 0.07	18 vs 12	3
Domestic Accidents	2.12 [1.05, 4.29], p = 0.04	94%, p < 0.001	41 vs 24	4
Location of Injury				
Home	3.96 [0.95, 16.61], p = 0.06	98%, p < 0.001	68 vs 39	3
Public Area	0.32 [0.02, 5.85], p = 0.44	100%, p < 0.001	27 vs 66	2
School or Daycare or Residential Care	0.26 [0.04, 1.54], p = 0.14	87%, p < 0.001	2 vs 9	3
Sports Area	0.36 [0.16, 0.79], p = 0.01	81%, p = 0.006	4 vs 15	3

fragility hip fracture remained stable.[33] It has been found that individuals with hip fracture and concomitant COVID-19 are associated with increased risk of mortality.[34] During the current outbreak, this high-risk population remains a clinical priority who requires immediate surgical intervention. Post-operatively, the incidence of inpatients falls was reported to be higher during the pandemic, which concerns their recovery and sometimes necessitates re-operation.[20] The proportion of fractures in the hand during the pandemic was only 75% of those in the pre-pandemic period. Traffic accidents contributed greatly to hand traumatic injuries during the pre-pandemic pandemic, followed by work-related trauma, sports-related trauma, and other causes. However, the majority of hand and wrist injuries during the pandemic were due to domestic accidents that occurred in the home or surrounding environment rather than in public places.[19]

Delays in seeking medical care, including attending alternative or traditional treatment, during the COVID-19 outbreak can be devastating, especially in cases of fracture requiring emergency surgical intervention. Acute and chronic complications such as compartment syndrome, soft tissue infection, osteomyelitis, delayed union, malunion, and nonunion may arise and add the burden of already overwhelmed medical personnel.[35] Given the strict controls over the mobility of population and several mitigation approach, some patients may find it difficult to reach medical services and consequently result in delays in management. In this study, we did not include time to presentation in our meta-analysis considering the different properties of each fracture. Certain fractures are considered elective and therefore do not require urgent management, which is distinctly different from life-threatening traumatic fractures. Moreover, time to surgery was not included in the meta-analysis since it also depends on a case-by-case basis. For example, surgery performed within 24 h of admission to patients with a hip fracture significantly reduces 1-year mortality and morbidity, while delaying surgery may increase the likelihood of 30-day mortality and complications.[34,36] This meta-analysis noted an increase in mortality in patients with fracture during the pandemic. Although the specific cause was not reported, the abovementioned factors are thought to have contributed to the higher proportion of deaths.

The proportion of open fractures was lower during the pandemic but not significantly different from the pre-pandemic period. The increase in domestic accidents during the epidemic period plays a role in this finding. The proportion of operative management also reduced during the pandemic, but this decline was not significant compared to the pre-pandemic period. Depending on the location, severity, and complexity of fracture, most fractures require surgical management but some cases can be managed conservatively. However, we found that proportion of mortality during the pandemic was up to 2 times higher than that reported during the pre-pandemic period. A positive COVID-19 infection can worsen the prognosis of certain groups of patients, such as elderly with traumatic fractures, thereby increasing the morbidity and mortality. The prevalence of comorbidities, physical deterioration, and possible psychological problems put the elderly at a greater risk of accidental events.[18]

Relating to the mechanism of injury, the proportion of sports-related trauma was significantly lower during the pandemic compared to the control period, whereas the proportion of work-related trauma was significantly higher in the pandemic than in the pre-pandemic period. The suspension of sports events, school activities, and work from office contributed to the change in proportion in both timeframes. Prior to the COVID-19 epidemic, motor vehicle accidents accounted the largest percentage of all trauma cases, but this figure has fallen dramatically due to restrictions of mobility and travel, although the decline in proportion is not statistically significant. In the pandemic period, the proportion of low-energy fall was borderline significant, while high-energy fall and domestic accidents was significantly higher than in the control period. Low-energy fall is equivalent to a fall from a standing height or a height <1 m (e.g. bed, chair, stool, standing, walking, slipping), while high-energy fall is equivalent to a fall from a height >1 m (e.g. roof, tree, trampoline, playground).[18] During the outbreak, low-energy fall is most commonly seen in elderly and resulted in fragility fractures.[17,18,24] Low-energy fall is also a major cause of humeral fracture,[23] which most frequently affect the proximal part (head), followed by the middle (shaft) and distal part. Even though

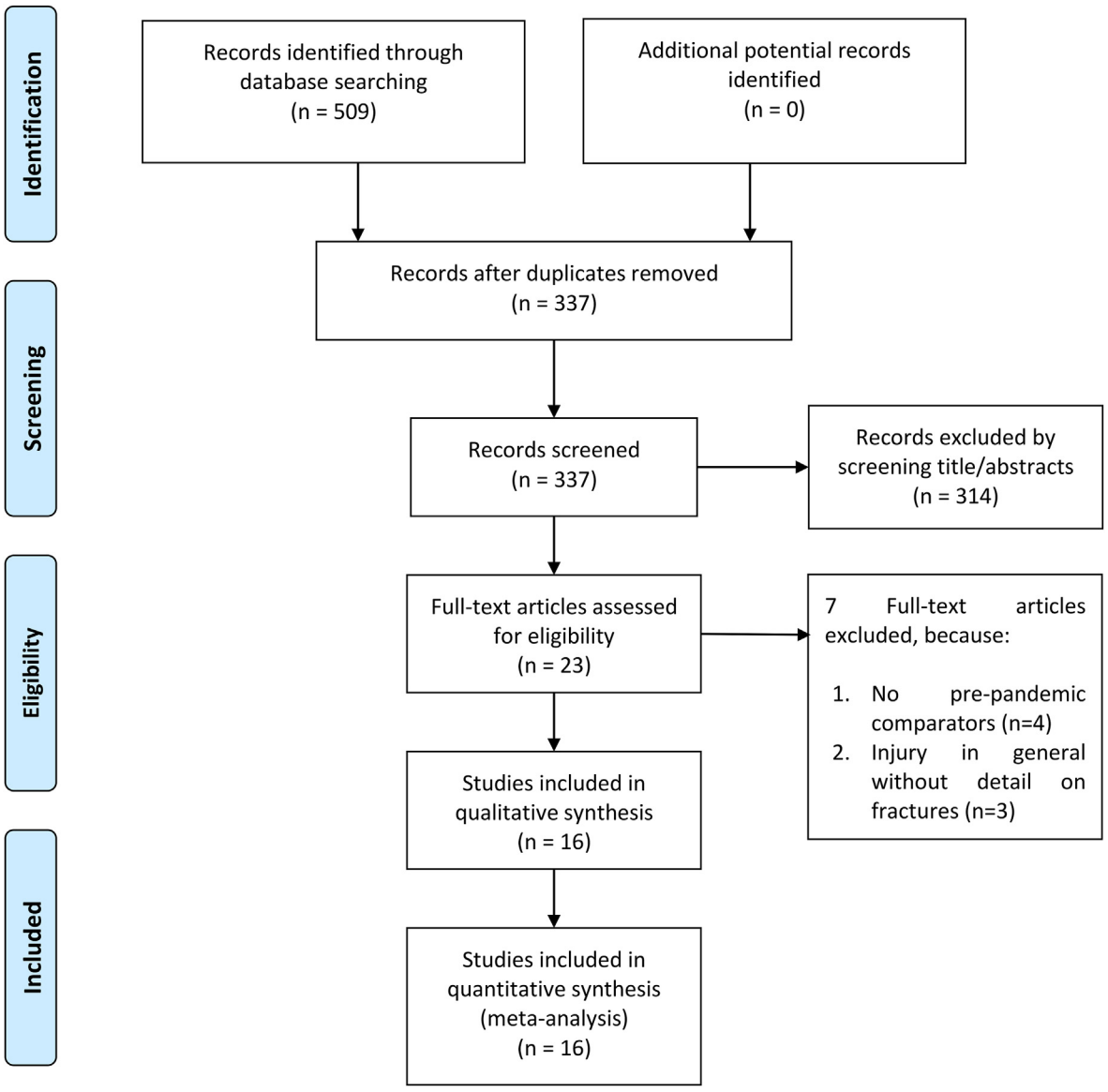

Fig. 1. PRISMA flowchart.

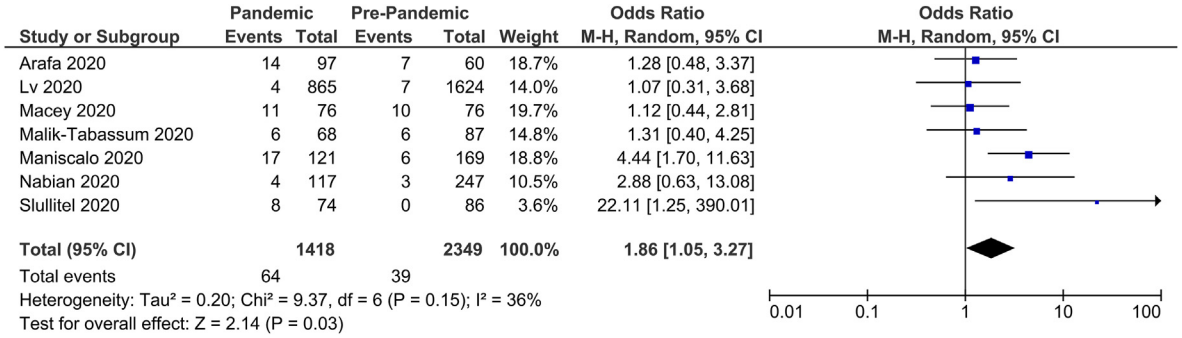

Fig. 2. 30-days mortality.

humerus is not the most frequent site of fractures during this pandemic, some cases such as complex and displaced fractures require surgical management. Post-operatively, the majority of patients had good outcomes with respect to COVID-19-associated respiratory complications.[37] In contrary, high-energy is frequently reported in children while playing.[17,21,28] Domestic accidents are events that are not related to sport, traffic, or vehicles, which have implications for those occur at home or its surrounding.[38]

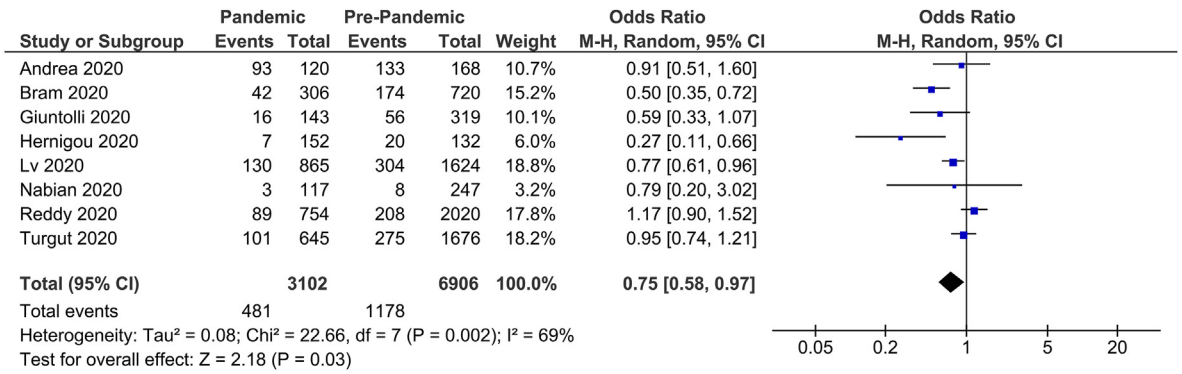

Fig. 3. Number of hand fractures.

Table 3
Pandemic and pre-pandemic fracture sites.

First Author	Scapula	Clavicle	Humerus	Radius and Ulna	Carpus and Hand	Spine	Pelvic and Acetabulum	Femur	Tibia and Fibula	Foot and Ankle
Andrea 2020	N/A	N/A	N/A	27 vs 35	93 vs 133	N/A	N/A	N/A	N/A	N/A
Arafa 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	97 vs 60	N/A	N/A
Bram 2020	N/A	14 vs 32.5	48 vs 72.5	161 vs 295.5	42 vs 174	N/A	N/A	8 vs 16	63 vs 150.5	34 vs 80
Dhillon 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Giuntoli 2020	N/A	5 vs 8	10 vs 21	20 vs 62	16 vs 56	N/A	5 vs 12	44 vs 49	6 vs 18	30 vs 77
Gumina 2020	0 vs 3	2 vs 5	17 vs 22	3 vs 11	N/A	N/A	N/A	N/A	N/A	N/A
Hernigou 2020	N/A	N/A	12 vs 12	17 vs 26	7 vs 20	N/A	N/A	26 vs 37	3 vs 4	9 vs 15
Lv 2020	N/A	N/A	83 vs 130	71 vs 149	130 vs 304 (hand and foot)	93 vs 203	22 vs 38	296 vs 434	137 vs 289	130 vs 304 (hand and foot)
Macey 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	76 vs 76	N/A	N/A
Malik-Tabassum 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	68 vs 87	N/A	N/A
Maniscalo 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	121 vs 169	N/A	N/A
Nabian 2020	0 vs 2	3 vs 3	18 vs 17	52 vs 46	3 vs 8	N/A	0 vs 0	7 vs 8	15 vs 15	3 vs 5
Nuñez 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36 vs 42	N/A	N/A
Reddy 2020	N/A	12 vs 59	36 vs 103	103 vs 238	89 vs 208	7 vs 27	4 vs 37	231 vs 508	102 vs 406	52 vs 156
Slullitel 2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	74 vs 86	N/A	N/A
Turgut 2020	2 vs 4.5	26 vs 65.5	103 vs 308	175 vs 537.5	101 vs 275	N/A	7 vs 20	53 vs 94.5	51 vs 97	146 vs 353.5

*compares pandemic group vs control group.
NA: Not Available/Not Reported/Reported in different classification.

In terms of location where the injury was sustained, the proportion of that occurring in public (community, street), school, daycare, or residential care, and sports area were lower during the pandemic than in the control period, even though the result were only significant in sports area.[21,22,24,25] Restrictions on outdoor activities and encouragement to stay at home contributed to the reduction of proportion between the two periods. However, this advice also prolongs the duration that people are at home and doing their new normal activities. Therefore, this condition played a part to a rise in the proportion of injury that occur at home (almost 4 times higher) during the pandemic, and this finding is borderline significant.[21,24,25]

We should pay more attention to the prevention of home injuries during the outbreak. Providing home exercises can help improve the strength, posture, balance, and aerobic capacity of the elderly, thereby reducing the risk of falls and consequently osteoporotic fractures. In addition, regular exercise increases immunity including against viruses and is recommended to individuals at all ages.[39,40] Currently, access to health services can be reached easily through the use of internet-based communication. Post-operative rehabilitation and follow-up can be carried out virtually at the convenience of the patient and the physician or therapist. The use of audio-visual consultation and rehabilitation in orthopaedic service is cost-effective, can reduce travel time and expenses, and is associated with greater patient satisfaction, comparable outcomes, and improved quality of life years gained (QALYs).[41–44]

5. Conclusion

During the COVID-19 pandemic, the number of fractures admitted to hospitals has decreased compared to the pre-pandemic, but the proportion of hand fractures was found to be higher. The 30-day mortality associated with fractures was higher during the pandemic. In terms of the mechanism of injury, work-related traumas, high-energy falls, and domestic accidents were more common during the pandemic, while sports-related traumas were found to be less. Regarding the location where the injuries sustained, those that occurred in the sports area were lower than before the pandemic.

Author contributions

M.A.L., K.G.M.R., and R.P. confirm being the only contributors of this work and have approved it for publication.

Table 4
Characteristics and managements of fractures.

First Author	Open Fracture = n (%)	Mean Time to Surgery (hours)	Non-operative management = n (%)	Operative Management = n (%)	30-day Mortality = n (%)
Andrea 2020	34 (28.3) vs 53 (31.5)	N/A	0 (0) vs 0 (0)	120 (100) vs 168 (100)	N/A
Arafa 2020	N/A	28.89 ± 43.08 vs 24.96 ± 15.43	0 (0) vs 0 (0)	97 (100) vs 60 (100)	14 (10.3) vs 7 (11.7)
Bram 2020	1 (0.3) vs 9 (1.1)	N/A	281 (91.8) vs 653 (90.8)	25 (8.2) vs 66.5 (9.2)	N/A
Dhillon 2020	101 (38.4) vs 247 (40.4)	N/A	32 (12.2) vs 47 (7.7)	220 (83.6) vs 547 (89.5)	N/A
Giuntoli 2020	N/A	N/A	78 (54.4) vs 225 (70.5)	65 (45.4) vs 94 (29.5)	N/A
Gumina 2020	N/A	N/A	N/A	N/A	N/A
Hernigou 2020	N/A	N/A	52 (34.2) vs 0 (0)	100 (65.8) vs 132 (100)	N/A
Lv 2020	48 (5.5) vs 199	N/A	60 (6.9) vs 20 (1.8)	805 (93.1) vs 1604 (98.2)	4 (0.46) vs 7 (0.43)[a]
Macey 2020	N/A	23 (18–30) vs 20 (16–15)[b]	3 (3.9) vs 3 (3.9)	73 (96.0) vs 73 (96.0)	11 (14.5) vs 10 (13.2)
Malik-Tabassum 2020	N/A	21.8 ± 12.1 vs 27.3 ± 38.2	2 (2.9) vs 1 (1.1)	66 (97.1) vs 86 (98.8)	6 (8.8) vs 6 (3.4)
Maniscalo 2020	N/A	N/A	0 (0) vs 0 (0)	121 (100) vs 169 (100)	17 (14.0) vs 6 (3.5)
Nuñez 2020	N/A	N/A	N/A	N/A	4 (11.1) vs 2.7 (6.3)[a]
Nabian 2020	2 (1.7) vs 12 (0.6)	N/A	N/A	N/A	N/A
Reddy 2020	N/A	N/A	245 (32.5) vs 395 (19.5)	509 (67.5) vs 1625 (80.4)	N/A
Slullitel 2020	N/A	24 (24–48) vs 16.5 (9–30)[b]	1 (1.3) vs 0 (0)	73 (98.6) vs 86 (100)	8 (10.8) vs 0 (0)
Turgut 2020	26 (7.4) vs 38.5 (3.9)	0.6 ± 0.9 vs 1.0 ± 1.8[c,d]	561 (83.7) vs 1548 (87.4)	109 (16.3) vs 222.5 (12.6)	N/A

*compares pandemic group vs control group.
[a] In-hospital mortality.
[b] Median.
[c] Presented in days.
[d] Combined result of proximal femur and distal humerus fractures.

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Declaration of competing interest

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