



Shifting Patterns in Mandibular Fracture Cases Pre and during COVID-19 Pandemic: An Examination through Retrospective Analysis

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KEYWORDS

Covid-19, Mandibular, retrospective analysis

ABSTRACT

This study investigates the shifting patterns of mandibular fracture cases at RSUD Dr. Soetomo before and during the COVID-19 pandemic. A retrospective descriptive analysis was performed on a population of 78 patients treated for mandibular fractures at RSUD Dr. Soetomo between 1st September 2019 and 2nd September 2020. The sample was selected based on predetermined inclusion and exclusion criteria, with data collected from medical records. The analysis focused on changes in incidence, demographic profiles, mechanisms of injury, anatomical locations, characteristics, and treatment approaches. These findings provide insights into the impact of the COVID-19 pandemic on trauma care management and the adaptability of healthcare systems during global health crises.

DOI: 10.58860/ijsh.v3i12.273

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INTRODUCTION

The coronavirus disease (COVID-19) emerged in late 2019, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This global health crisis, known as the COVID-19 pandemic, has significantly impacted healthcare systems, economies, and societies worldwide (Kaye et al., 2021). The pandemic brought profound changes to healthcare services, including reconfigurations of service delivery, resource reallocations, and the adoption of stringent infection control measures, posing both theoretical and practical challenges in the healthcare sector.

In Indonesia, lockdown measures were implemented on March 20, 2020, to curb the escalating COVID-19 cases. These measures led to widespread changes in societal behavior and daily activities. For instance, restrictions on movement and reduced outdoor activities during quarantine resulted in a marked decrease in vehicular accidents, highlighting a shift in injury patterns during the pandemic (Lee, Liu, & Abdel-Aty, 2023). Previous studies have explored the effects of the COVID-19 pandemic on various healthcare outcomes, including trauma-related injuries. However, limited research has specifically examined the pandemic's impact on mandibular fracture patterns (Boom, Wolvius, & Rozeboom, 2022).

This research focuses on addressing this gap by investigating the shifting patterns of mandibular fractures during the COVID-19 pandemic (Brar, Bayoumy, Salama, Henry, & Chigurupati, 2021). A retrospective analysis will be conducted to assess fracture occurrences before and during the pandemic, identifying patterns and analyzing the changes in patient demographics, mechanisms of injury, fracture types and locations, and treatment protocols. By examining these aspects, this study aims to contribute to the theoretical understanding of how external crises influence trauma-related injuries and provide practical insights for managing mandibular fractures in similar scenarios.

METHOD

This study employs a retrospective design to investigate shifting patterns of mandibular fracture cases before and during the COVID-19 pandemic. Data were collected from archived medical records to examine demographic characteristics, mechanisms of injury, and treatment outcomes associated with mandibular fractures during two distinct periods: the pre-pandemic phase (September 1, 2019, to March 1, 2020) and the pandemic phase (March 2, 2020, to September 2, 2020). Ethical approval for this research was obtained from the Komite Etik Penelitian Kesehatan RSUD Dr. Soetomo Surabaya (clearance number: 3136/108/4/IX/2024).

The study focuses on cases meeting predefined criteria related to demographic details, types of mandibular fractures, anatomical locations, and treatments administered within the specified timeframes. Archived medical records served as the primary data source, ensuring the inclusion of relevant variables such as patient demographics, fracture characteristics, and treatment approaches. A systematic review of the records was conducted to identify and document cases that fit the study's scope.

The collected data underwent a thorough cleaning process to address missing or inconsistent values, using imputation or case exclusion as needed. Key variables were extracted and organized for comparative analysis. Statistical tests were employed to formulate and evaluate hypotheses, aiming to identify significant differences and associations between pre-pandemic and pandemic periods (Szczepańska-Woszczyńska, Wysocka, & Kwilinski, 2024). Findings were visualized using bar charts, pie charts, histograms, and scatter plots to facilitate interpretation. Finally, the analyzed data were interpreted to reveal trends and patterns, offering insights into the evolving dynamics of mandibular fracture cases during the study period.

RESULT AND DISCUSSION

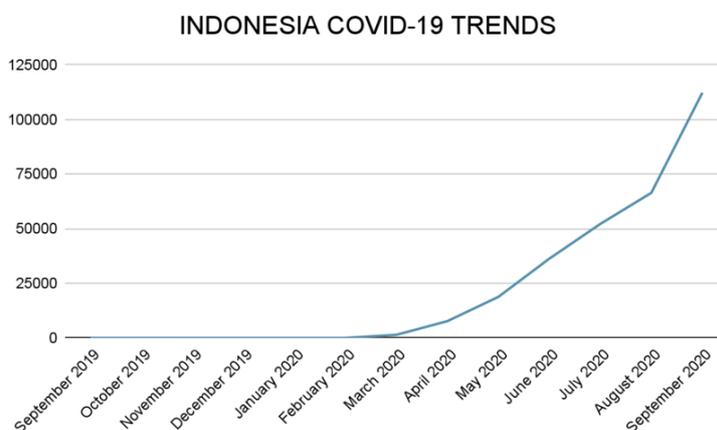


Figure 1. Indonesia Covid-19 Trend

The data from the Ministry of Health Republic Indonesia of COVID-19 reported cases, with the first 1.414 recorded data being from March 2nd, 2020, whereas the first case of COVID-19 in Indonesia and the initial lockdown was implemented on March 20, 2019. The monthly trend of COVID-19 cases showed a consistent and significant increase in reported cases.

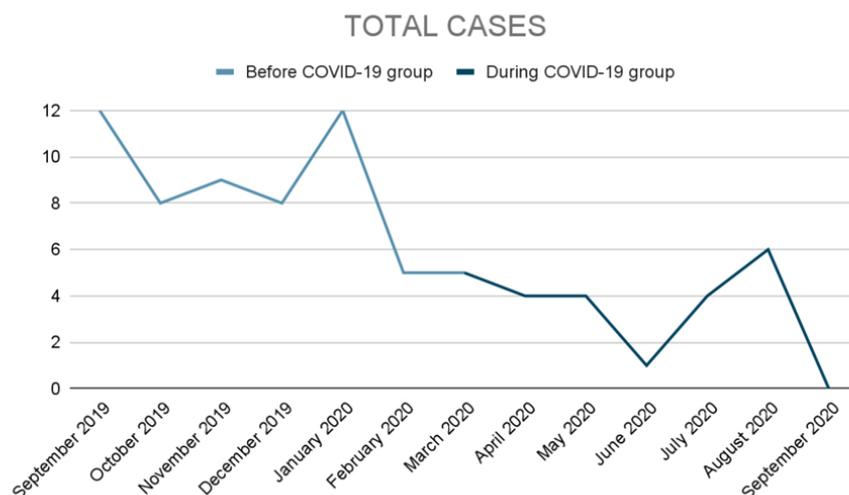


Figure 2. Total Case

A total of 78 Cases were included, Meeting the study’s inclusion criteria. There was a decrease in cases, with a significant reduction of cases per month. The highest number of cases before COVID-19 was 12 (January 2020), while the highest number during COVID-19 was 6 (August 2020). The average number of cases before COVID-19 was 9, compared to 4 during COVID-19.

Figure 5.3 Both case trend

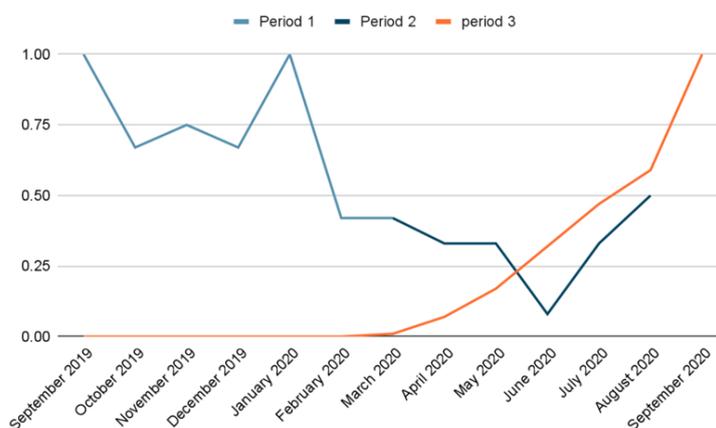


Figure 3. Both Case Trend

The initial rise in COVID-19 cases from March 2020 coincided with a steep decline in mandibular fracture cases, which reached their lowest levels between March and May 2020. Starting in June 2020, there was a noticeable increase in mandibular fracture cases, despite the continued rise in COVID-19 cases (Jean et al., 2022).

Gender Ratio

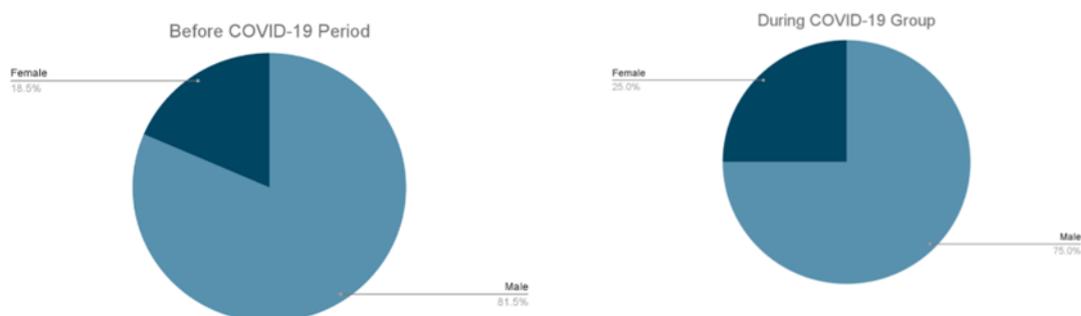


Figure 4. Gender Ratio

The gender distribution remained consistent across both periods, with mandibular fractures being more common in males. Specifically, 61 cases (79%) were male, while 16 cases (21%) were female.

Age

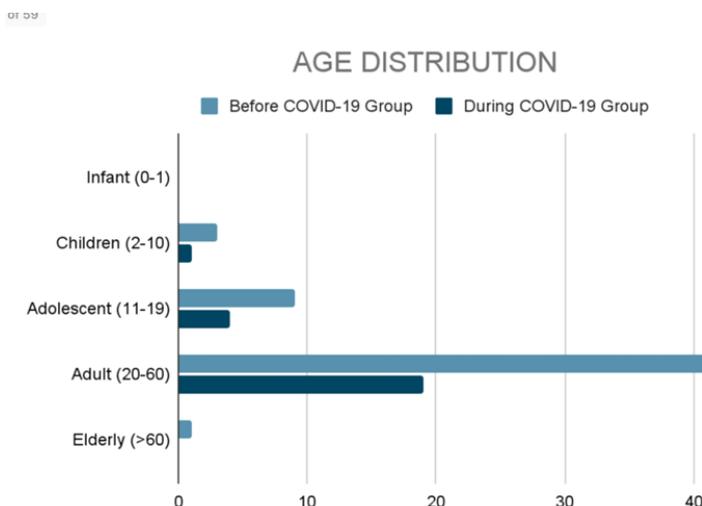


Figure 5. Age Distribution

The majority of fractures were observed in the 20-60 years age group, The mean age of patients was 27 years before the pandemic and increased to 31 years during the pandemic.

Mechanism of Injury

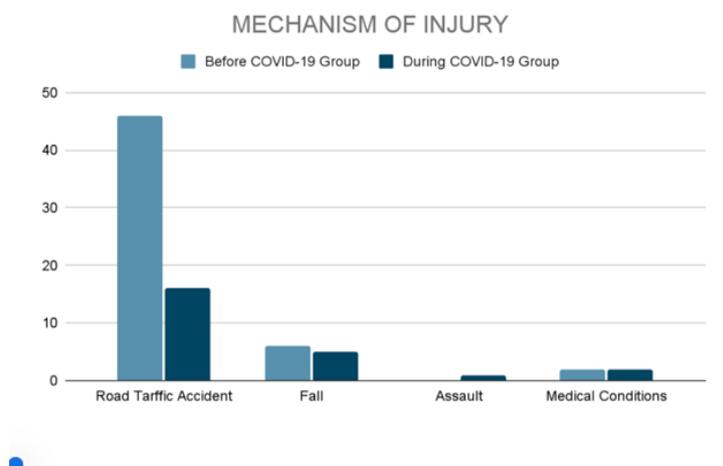


Figure 6. Mechanism of Injury

The mechanisms of injury also showed notable changes. Before the pandemic, road traffic accidents accounted for 85.19% of the cases, whereas during the pandemic, this proportion dropped to 66.67%. Falls accounted for 11.11% of the cases before COVID-19 and increased to 20.83% during the pandemic, while assault cases, which were not present before COVID-19, represented 4.17% of the cases during the pandemic.

Table 1. Location of Fracture
Anatomical Location of Fracture

	Before COVID-19 group	During COVID-19 group
Body	19	10
Condylar	6	1
Parasymphysis and Symphysis	10	3
Angle and Ramus	11	1
Dento-alveolar	1	2
Coronoid	1	0
Body + Angle and Ramus	2	5
Condylar + Angle and Ramus	2	1
Parasymphysis and Symphysis + Condylar	1	0
Parasymphysis and Symphysis + Body	1	0
Parasymphysis and Symphysis + Angle and Ramus	0	1

Total Fracture	54	24
<i>Total Fracture from site</i>	<i>60</i>	<i>31</i>

The anatomical distribution of mandibular fractures varied between the pre-pandemic and pandemic periods. The body of the mandible accounted for 31.67% of fractures before COVID-19 and 32.26% during the pandemic. Condylar fractures decreased from 10% to 3.23%, while parasymphysis and symphysis fractures reduced from 16.67% to 9.68%. Fractures in the angle and ramus regions decreased significantly from 18.33% pre-pandemic to 3.23% during the pandemic. In contrast, fractures in the dento-alveolar region showed an increase from 1.67% to 6.45%. Regarding multiple fractures, 10% of cases involved multiple sites before COVID-19, rising to 22.58% during the pandemic.

Characteristic of fracture

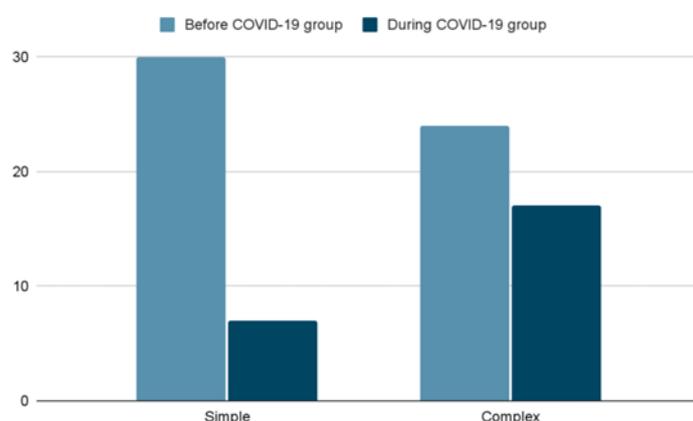


Figure 7. Characteristic of Fracture

The study classified fractures into simple and complex types. Simple fractures totaled 37 cases (47.44%), and complex fractures totaled 41 cases (52.56%). Simple fractures comprised 30 out of 54 cases (55.56%) before COVID-19 and 7 out of 24 cases (29.17%) during the pandemic. In contrast, complex fractures accounted for 24 out of 54 cases (44.44%) before COVID-19 and 17 out of 24 cases (70.83%) during the pandemic. Multiple fractures were observed in 6 cases (10%) before COVID-19 and 7 cases (22.58%) during the pandemic.

Treatment provided

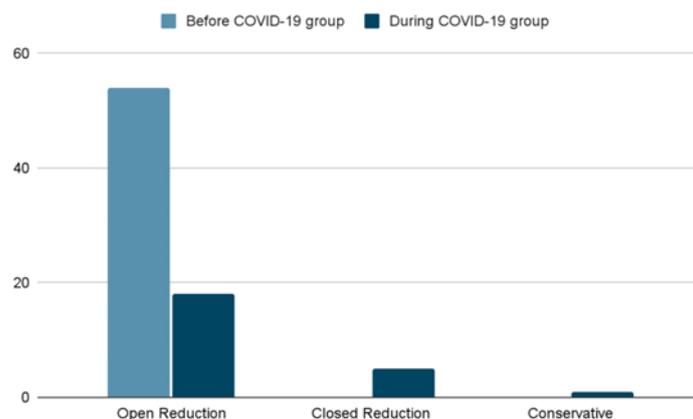


Figure 8. Treatment provided

During the COVID-19 period, closed reduction was performed in 20.9% of cases, open reduction in 75%, and conservative treatment in 4.1%. Before COVID-19, open reduction was conducted in 100% of cases using ORIF with plates and screws. The average duration of hospitalization was 10 days before COVID-19 and 9 days during COVID-19.

Over the span of this year-long study (1st September 2019–2nd September 2020), with the first COVID-19 case recorded on 2nd March 2020, there were 295,001 reported COVID-19 cases during the pandemic period. Mandibular fractures at RSUD Dr. Soetomo also showed notable changes, with 54 cases before COVID-19 dropping to 24 cases during the pandemic, a 65.56% decline. Males consistently comprised the majority of cases (81.5% pre-pandemic, 75% during the pandemic), and adults aged 20–60 represented 76.97% of cases across both periods. Infants and elderly populations showed no significant risk of mandibular fractures during either phase, suggesting minimal exposure to contributing factors (Saxon, Etten, Perkins, & RNL, 2021).

Injury mechanisms highlighted a dominance of road traffic accidents, accounting for 79.49% of cases, though their prevalence decreased by 18.52% during the pandemic. Falls, assault, and medical conditions became more prominent during COVID-19, reflecting changes in trauma patterns as more people stayed at home (Lara-Reyna et al., 2020). Assault cases emerged exclusively during the pandemic, accounting for 4.17%. Anatomical fracture locations shifted slightly, with reductions in condylar, parasymphysis, and angle fractures but an increase in dento-alveolar fractures and multiple fracture cases, which rose significantly from 10% to 22.58% during the pandemic.

The study observed an increase in the complexity of mandibular fractures during the pandemic. Simple fractures decreased from 55.56% to 29.17%, while complex fractures rose sharply to 70.83%, indicating more severe injuries. This shift could be attributed to changes in trauma mechanisms or pandemic-induced lifestyle factors. Treatment approaches adapted as well, with closed reduction used in 20.9% of cases during the pandemic, compared to 100% reliance on open reduction pre-pandemic. Hemimandibulectomy and conservative treatments also emerged as additional management options, reflecting adjustments to minimize surgical risks and contact during the pandemic (Adkins, 2023).

Despite fewer cases, the complexity and severity of mandibular fractures during COVID-19 required substantial care, as shown by the average hospitalization duration remaining nearly unchanged (10 days pre-pandemic vs. 9 days during the pandemic). These findings underscore a significant shift in fracture patterns, mechanisms of injury, and treatment approaches during the pandemic, offering valuable insights into trauma care in changing circumstances (Hussain, Wang, & Li, 2023).

CONCLUSION

The study identified significant variations in the frequency, anatomical distribution, characteristics, and treatment approaches for mandibular fractures, which were influenced by lockdown measures and shifts in societal behavior during the COVID-19 pandemic. The findings revealed a marked reduction in the frequency of mandibular fractures during the pandemic, consistent with previous research indicating a decline in trauma cases due to restricted outdoor activities and reduced mobility during lockdowns. In terms of demographics, the incidence of mandibular fractures among males remained consistently high across both periods, with the average affected individuals being adults. This trend suggests that adult males continued to engage in high-risk activities irrespective of lockdown conditions. While road traffic accidents were the predominant cause of mandibular fractures in both periods, their incidence declined during the pandemic, whereas cases resulting from falls and assaults showed a marginal increase, indicating a shift toward indoor-related injuries during the COVID-19 period.

Patients treated at RSUD Dr. Soetomo predominantly presented with mandibular body fractures during both periods. However, the pandemic period saw an increase in the complexity and multiplicity of fractures compared to the pre-pandemic period, where simpler fracture cases were more common. This suggests a paradoxical increase in injury severity despite the overall decline in trauma cases. Treatment protocols also underwent notable changes. During the pandemic, there was a marked shift toward closed reduction techniques, likely driven by the need to minimize exposure and the risk of COVID-19 transmission. In contrast, open reduction was the standard approach before the pandemic, suggesting a shift in clinical preferences influenced by pandemic-related constraints.

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