Impact of COVID-19 lockdown on the spectrum of trauma patients at a major trauma center in central India: A retrospective observational study

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ABSTRACT

Context: A total lockdown was announced in India from March 25 to May 31 in four phases in response to the COVID-19 pandemic. This study aimed to study the impact of this national lockdown on the volume and the nature of injuries in patients admitted during this period at a major trauma center in central India.

Methods: This is a retrospective descriptive study of prospectively collected data which were collected from the hospital records. Patients admitted to the trauma center during lockdown were compared to patients admitted in the prelockdown period for the change in volume and spectrum and severity of injuries across all age groups and both genders.

Results: There was a significant fall in the overall number of trauma patients across all age groups and both genders during the lockdown period (66.8%). There was a significant decrease in numbers among males (68.1%). Road traffic accidents decreased by 75.2%. There was a relative increase in trauma due to fall and assault during the lockdown period. The mortality due to trauma decreased significantly by 79.8%.

Conclusions: There has been an overall decrease in the number of patients admitted to the trauma center during the lockdown period. However, there is a relative increase in preventable injuries such as falls, assault, and animal-related injuries. Focused strategies to decrease preventable injuries need to be devised to reduce the load on overburdened resources during the COVID-19 crisis.

Key Words: COVID-19, falls, lockdown, pandemic, road traffic accident, trauma

INTRODUCTION

COVID-19 pandemic was announced on March 11, 2020 by the World Health Organization.[1] A complete lockdown was announced globally as a measure to contain the spread of the COVID-19 pandemic in phases. In India too, a complete lockdown was announced from March 25 to May 31 in four phases (64 days). Although the lockdown continues, many relaxations have now been announced.

Many trauma centers in India have been converted to COVID-19 hospitals during the lockdown.[2] This decision was made due to the increasing load of COVID-19 patients and the assumption that the number of trauma patients has reduced during the lockdown. It is important to know in this scenario the actual change in volume and change in spectrum of trauma patients.
in the spectrum of injuries during the lockdown. One of the earliest studies that tried to examine these issues was from New Zealand.\[3\] Few studies followed this study, but there was none from the Indian subcontinent.

Our trauma care center is a stand-alone facility with 100 beds with 20 ventilators. It was decided to repurpose it into a COVID-19 center. The trauma patients were shifted to the main hospital building with a dedicated ward, operation theater, and an intensive care unit (ICU) attached to it. Many trauma staff members were recruited for COVID-19 hospital duties. Thus, there was a diversion of resources from the trauma care center.

We planned to study the impact of COVID-19 lockdown in the four phases on the trauma referrals in terms of volumes and spectrum and severity of injuries. Trauma mortality figures were also recorded and analyzed. The data of the spectrum of injuries are expected to help in devising focused preventive strategies.

**METHODS**

A retrospective collection of data of all patients admitted sequentially during the national lockdown for COVID-19 was done. A complete lockdown was announced in four phases in India. This period was from March 25, 2020 to May 31, 2020 (64 days). Similar data were obtained in the 64 days (January 13 to March 16) in the immediate prelockdown period. An intervening period of 1 week from March 17 to March 24 was excluded because there was a partial lockdown during this period. The data of the lockdown and prelockdown periods were compared.

These data included the total number of patients admitted to the trauma center, their age and gender, causes of injury, and severity of the injury. Mortality figures were also recorded during the study period. Patients of all age group admitted within a week of injury were included. Patients were divided into three age bands. This age band distribution was adapted and modified from a previous study.\[3\] The first age band was between 0 and 15, the next was 15–60, and the last band was >60 age group patients. The first band comprised mainly of the school-going kids, whereas the next band had young adults and middle-aged individuals, and the last group had elderly patients. The injuries were categorized according to the mechanism of injury. The most common injury mechanism in our center being road traffic accidents, assault, falls, and animal-related trauma. The miscellaneous injuries were recorded as "others." Injuries due to flame burns and patients of drowning, hanging, and asphyxiation were excluded as they are managed in the burn unit and medicine department, respectively, in our institute. The other variable which was recorded was the injury severity score (ISS).\[4\] The patients with scores >12 were labeled as major and those ≤12 were labeled as moderate. Length of stay in the hospital, length of stay in the ICU, and the need for operative intervention were recorded. Associated comorbidities were also noted. All the patients who were discharged were sent home.

An approval from the institutional ethical committee was obtained with a waiver of written informed consent. The study was registered with the Central Trial Registry of India (registration number CTRI/2020/05/025297). This manuscript adheres to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.

**Statistical analysis**

All the cases under study were entered in the Microsoft®Excel® 2016 sheet. (Redmond Washington U.S.A). The data from the excel sheet were imported to Epi Info (version 7.2. 10 Atlanta, GA, USA, CDC) for analysis. Descriptive statistics were used to display proportions as used for categorical variables. Categorical data were expressed in frequency and percentages. Continuous variables were presented as mean ± standard deviation for normalized data. Continuous variables were compared between pre and during the lockdown period by performing an independent t-test for normalized data and Mann–Whitney test was performed for nonnormalized data. Chi-square test for goodness of fit was used to show the significant distribution and P < 0.05 was considered statistically significant.

**RESULTS**

The total number of patients studied was 1044 out of which 784 were admitted in the prelockdown period, whereas 260 patients were admitted in the lockdown period. There was an overall decrease of total admissions of 66.8% [Table 1]. There was a reduction in the number of patients in the middle-aged group (16–60 years). However, there was a relative increase in the number of females injured during the lockdown as compared to the prelockdown.

There was a decrease in the total number of injuries due to all causes. Road traffic accidents were significantly reduced (75.2%). However, there was a relative increase in injuries due to falls and as a result of an assault.

Major severity cases (ISS > 12) were more than moderate severity cases (ISS ≤ 12) in the lockdown period as compared to the prelockdown period where it was just the reverse [Table 2].

Ventilation was required in 8.2% of cases in the prelockdown period as compared to 6.5% requiring the same during the lockdown period. Admission to the ICU was required in 12.6% of cases in the prelockdown period as compared to 12.3% during the lockdown.
Operative interventions were required in 16.7% of cases in the prelockdown period and during the lockdown period, 17% of cases required operative interventions.

There were 33 deaths during the lockdown as compared to 161 in the prelockdown period. The number of deaths calculated as a percentage of total admissions during the respective period also showed a decrease in mortality figures during the lockdown.

**DISCUSSION**

This study revealed that there was a significant decrease in the number of patients of trauma admitted at our trauma center during the lockdown period announced after the COVID-19 pandemic in India across all age groups and in both genders. However, there was a relative increase in injuries among females which could be attributed to an increase in domestic violence during the lockdown period. Although we have not separately recorded the incidence of domestic violence, it can be hypothesized that these resulted from domestic violence as there was no incidence of domestic violence, it can be hypothesized that these resulted from domestic violence as there was no opportunity to socialize during these months. Moreover, a global spike in domestic violence against females has also been reported during the lockdown. Male injuries were significantly low because of restrictions in outdoor activities during the lockdown. The relative increase in assault and falls is related to domestic violence and do it yourself type of activities at home.

There are only a few studies that have examined the impact of COVID-19 lockdown on trauma referrals. A study from New Zealand has reported similar results. The said study was done over a short time frame of 14 days as compared to our study which covered the 64 days of all the four phases of the complete lockdown. There was a 43% decrease in the overall volume of injury admissions during the nationwide lockdown, with a statistically significant decrease in patients with moderate severity injuries (ISS ≤12) and an absolute decrease in the number of road accidents and falls.[3] The Royal College of Emergency Medicine from the UK reported a 25% fall in the visit to the emergency department.[8] A Chinese study showed a 39.2% reduction after the lockdown in the number of severe trauma patients (ISS>16) who needed critical care decreased from 42 to 6 in a month after the lockdown. The greatest reductions were seen in major injuries and male patients.[7] Kamine et al. also reported a 57.4% decrease in trauma admissions, with an 80.5% decrease in motor vehicle collisions during the lockdown period February–April 2020 in Portsmouth, USA.[8] Likewise, a center from South Africa reported a decrease of 47%
in trauma admissions to the emergency department during the lockdown.[9]

Although the total number of patients decreased significantly during lockdown, the major severity cases were more. The hospital interventions, ventilation requirements, and ICU admissions and operative interventions were almost the same in both cohorts. This fact has a bearing on the requirements of staff and resources during the lockdown.

The other important challenge in the management of trauma patients was access to health care. The closure of public transport and restrictions on private vehicles added to the hardships of these patients. Thus, the arrangement of care providers and blood donors became difficult.[10]

A partial lockdown continues in India at present. This partial opening up is likely to lead to an increase in the number of trauma patients as also the number of COVID-19 patients. This will lead to an overburdening of the resources. Emergency services do get adversely affected by the pandemic of this proportion. There is an urgent need for comprehensive short-term and long-term planning to rebuild the resources so that health care is delivered to both COVID-19 and non-COVID-19 patients.[11] These future challenges need to be addressed by the health authorities to manage emergencies and COVID-19 effectively. Since trauma centers have now been converted to COVID-19 hospitals, rapid construction of new trauma centers will be required in the coming days to cater to the rise in the number of patients in the postlockdown period. A multisectoral response of all stakeholders is necessary to mitigate the serious consequences of the COVID-19 pandemic.

The limitation of this study is that it was limited to our center only. A study involving multiple trauma centers could have been done to include a larger number of patients, but due to the pandemic, it was not possible. The post lockdown period could also have been included for comparison of trends. Another limitation of this study is that we have compared the lockdown period to immediately preceding months only. Ideally, data from previous years in the same date range should also be compared for a better understanding of changing trends. Since ours is a newly commissioned trauma center, this was not possible.

CONCLUSIONS

There has been an overall decrease in the number of patients admitted to the trauma center during the lockdown period. However, there is a relative increase in preventable injuries such as falls, assault, and animal-related injuries. Major severity cases were more as compared to moderate severity cases. Likewise, hospital interventions such as the requirement for ventilation, ICU stay, and operative interventions were comparable in pre and during the lockdown period. Strategies to decrease preventable injuries need to be devised to reduce the load on overburdened resources during the COVID-19 crisis.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Research Quality and Ethics Statement:
This study was approved by the Institutional Review Board, and the study was registered with the Central Trial Registry of India (registration number CTRI/2020/05/025297). The authors followed applicable EQUATOR Network (http://www.equator-network.org/) guidelines, namely the STROBE guideline, during the conduct of this research project.

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