

# Impact of SARS COVID-2 Pandemic on Trauma: An Experience from a University Level Trauma Centre in North India

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**Abstract:** ***Background:** To combat COVID-19 pandemic transmission lockdown was declared by government of India twice. Between the lockdowns there was a period of unlock. This led to creation of crests and troughs in the number of patients presenting to our level III Trauma Centre. This study aimed to study the changing patterns of injuries during various phases of lockdown and unlock. **Methods:** This is a retrospective study done at Trauma Centre BHU Varanasi, Uttar Pradesh India. It included all patients coming to Triage of Trauma Centre from January 2020 to June 2021. This data was further subdivided into four groups- Pre-Lockdown, Lockdown1, Unlock and Lockdown2 and statistical analysis was done. **Results:** During Lockdown1 there was significant reduction in road traffic accidents and machinery injury cases with increase in cases of physical assaults, fall of object and stab injuries. While in unlock there was significant increase in road traffic accidents and firearm injury cases with decline in cases of other mode of injuries. Lockdown2 showed a generalized decline in almost all of the cases except stab injuries. **Conclusion:** COVID-19 and lockdown created a psychological stress among people with increased expression of fear and anger leading to increased cases of physical assaults and stab injuries. Due to restricted mobility and shutdown of industries there was decreased number of road traffic accidents and machinery injuries.*

**Keywords:** Lockdown, Unlock, Road traffic accidents, Physical assaults

## 1. Introduction

COVID-19 was declared as a pandemic on March 11 2020 by the World Health Organization [1]. Due to the rise in the number of cases, Government of India decided to impose lockdown to prevent the community spread. Complete lockdown was started in India on March 25<sup>th</sup> 2020 [2]. Initially it was done for a week but gradually it had to be extended till May 31<sup>st</sup> 2020. Partial lockdown was seen in the month of June 2020 [3]. This lockdown was effective in controlling the spread of coronavirus and thus unlock was started. Unlock was executed in a stepwise fashion like version 1.0, 2.0, etc. Total period of unlock was about nine months (from July 2020 to March 2021). This period initially showed a decrease in number of cases until the 2<sup>nd</sup> peak of COVID-19 started and cases started to rise exponentially. Whole nation was suffering so to prevent the transmission second time lockdown was implemented which was mainly in the month of April and May 2021 followed by a relaxation seen in the month of June 2021. Unlock was started from July 2021 [4].

This whole period of 18 months showed a variation in the number and mode of injuries as observed in our Trauma Centre which is a Level III Trauma Centre. During the second wave of COVID-19 our Trauma center had to be converted as COVID center with 100 beds. There were many studies which had demonstrated the change in the pattern of injuries during lockdown but our study was carried out taking a long duration including Pre-lockdown, lockdown, unlock and lockdown-2. This enabled us to study

the various trend in the number and pattern of injuries over this period.

## 2. Materials & Methods

**Study Design:** The study has included the trauma patients visiting Trauma Centre from January 2020 to June 2021. The study design was retrospective study and hospital records were assessed to find the number of patients attending Trauma Centre during specific time period along with mechanism of injury was taken into account.

**Ethics:** Details of injury and clinical details were not evaluated and hence no IRB approval was taken for the study.

**Inclusion criteria:** All patients who presented to the Triage of Trauma center from January 2020 to June 2021 with the history of road traffic accidents, fall from height or fall on ground, physical assault, firearm injury, stab injury, hit by animal, etc. were taken.

**Exclusion Criteria:** Patients of drowning, burns, asphyxiation, hanging and patients who were brought dead were excluded from the study.

The data of patients was further subdivided into four categories: Pre-lockdown, Lockdown-1, Unlock, and Lockdown-2.

**Pre-lockdown (PL):** It was the period from 1<sup>st</sup> January 2020 to 24<sup>th</sup> March 2020. This served as a control group when the Trauma center was functioning normally.

**Lockdown-1 (L1):** It was the period from 25<sup>th</sup> March 2020 to 30<sup>th</sup> June 2020. It included complete lockdown and partial lockdown both.

**Unlock (UL):** It was the period from 1<sup>st</sup> July 2020 to March 2021.

**Lockdown-2 (L2):** It was the period from 1<sup>st</sup> April 2021 to 30<sup>th</sup> June 2021. It included both complete and partial lockdown.

The mechanism of injury (MOI) was recorded as road traffic accidents (RTA), physical assault, fall, animal, machinery injury, fall of object (FAA), firearm injury (FI) and stab injury as these have been mainly the causes in most of patients visiting out trauma facility.

**Statistical Analysis:** We analyzed the data by using R software version 4.1.1. T test was used to calculate the

significance and p-value of  $\leq 0.05$  was considered significant.

### 3. Results

Our data was collected for a period of 18 months i.e., from 01/01/2020 to 30/06/2021. The data included the patients attending the emergency department along with the mode of injury. The data has been shown in various tables in different phases as compared to the various mechanism of injury.

The Mean and the Standard Deviation (SD) of the number of patients in all 4 phases of study as compared to the mechanism of injury have been shown in table 1. It can be appreciated that there was an abrupt decrease in the number of patients of RTA in L1 phase as compared to PL phase pre lock and again in L2 phase as compared to UL phase. Different pattern was observed in other MOI through various phases.

**Table 1:** Mean  $\pm$  Standard Deviation (SD) of number of patients coming to triage in different phases of lockdown

MOI	Pre-lockdown	Lockdown1	Unlock	Lockdown2
RTA	644.3 $\pm$ 80.2	300 $\pm$ 172.8	582.9 $\pm$ 187.8	451.3 $\pm$ 87.7
Physical Assault	106 $\pm$ 18.4	167.7 $\pm$ 55.5	112.7 $\pm$ 25.9	88.7 $\pm$ 26.7
Fall	576 $\pm$ 60.1	422.7 $\pm$ 138	346.2 $\pm$ 56.6	276.7 $\pm$ 133.5
Animal	17.3 $\pm$ 3.5	15 $\pm$ 5.3	10.1 $\pm$ 3.9	6.7 $\pm$ 2.5
Machinery injury	49.3 $\pm$ 14.2	26.7 $\pm$ 3.8	33.8 $\pm$ 14.3	18.7 $\pm$ 7.1
FOO	9 $\pm$ 4	11.7 $\pm$ 7.6	8.3 $\pm$ 3.5	5.7 $\pm$ 5.0
FI	9.7 $\pm$ 4.9	9.3 $\pm$ 3.1	14 $\pm$ 4.6	12.3 $\pm$ 7.6
Stab injury	1.7 $\pm$ 0.6	3 $\pm$ 1	1.9 $\pm$ 0.9	2.7 $\pm$ 1.2

\*MOI- Mechanism of Injury, RTA- Road Traffic Accident, Fall included patients who fell from height along with those fell on ground, Animal included patients who were hit by animal and those who had animal bite, FOO- Fall of object on body, FI- Firearm injury.

Data was separately analyzed among different groups and is shown in tables 2 to 6. It is clearly evident from the table 2 (which compared the data between Pre-Lockdown and Lockdown1) that there was significant reduction in RTA cases and machinery injury with p-value of 0.02 and 0.05 respectively. Physical assaults, stab injury and fall of object were increased in Lockdown1 but were not significant.

**Table 2:** Comparison between Pre-lockdown and Lockdown1

MOI	Pre-lockdown (mean)	Lockdown1 (mean)	%	p-value
RTA	644.3	300	-53.4	<b>0.02</b>
Physical Assault	106	167.7	+58.2	0.09
Fall	576	422.7	-26.7	0.09
Animal	17.3	15	-13.3	0.28
Machinery injury	49.3	26.7	-45.8	<b>0.05</b>
FOO	9	11.7	+30.0	0.32
FI	9.7	9.3	-4.1	0.46
Stab injury	1.7	3	+76.5	0.07

\*T test was used to calculate the significance and p-value of  $\leq 0.05$  was considered significant.

On comparing the data between Lockdown1 and Unlock which is shown in table 3 a significant increase in RTA cases and firearm injury was seen with p-value of 0.04 and 0.049 was seen respectively. Also, there was reduction in

physical assault, animal, fall of object, stab injury and fall cases but were not significant.

**Table 3:** Comparison between Lockdown1 and Unlock

MOI	Lockdown1 (mean)	Unlock (mean)	%	p-value
RTA	300	582.9	+94.3	<b>0.04</b>
Physical Assault	167.7	112.7	-32.8	0.11
Fall	422.7	346.2	-18.1	0.22
Animal	15	10.1	-32.7	0.12
Machinery injury	26.7	33.8	+26.6	0.1
FOO	11.7	8.3	-29.1	0.27
FI	9.3	14	+50.5	<b>0.049</b>
Stab injury	3	1.9	-36.7	0.09

\*T test was used to calculate the significance and p-value of  $\leq 0.05$  was considered significant.

Coming to the change in mode of injury between unlock and lockdown2 (which is shown in table 4) a common reduction in number of cases were seen in all groups except stab injury which rather increased in Lockdown2 but was not significant. A significant reduction was observed in machinery injury cases with a p-value of 0.02.

**Table 4:** Comparison between Unlock and Lockdown2

MOI	Unlock (mean)	Lockdown2 (mean)	%	p-value
RTA	582.9	451.3	-22.6	0.07
Physical Assault	112.7	88.7	-21.3	0.13
Fall	346.2	276.7	-20.1	0.23
Animal	10.1	6.7	-33.7	0.07
Machinery injury	33.8	18.7	-44.7	0.02
FOO	8.3	5.7	-31.3	0.23
FI	14	12.3	-12.1	0.37
Stab injury	1.9	2.7	+42.1	0.19

\*T test was used to calculate the significance and p-value of  $\leq 0.05$  was considered significant.

We also compared the data between both the lockdowns (shown in table 5). RTA and firearm injury cases were increased in Lockdown2 but were not significant. Generalized reductions in cases were seen in all other groups during lockdown2 with animal injury showing significant reduction with p-value of 0.047.

**Table 5:** Comparison between Lockdown1 and Lockdown2

MOI	Lockdown1 (mean)	Lockdown2 (mean)	%	p-value
RTA	300	451.3	+50.4	0.14
Physical Assault	167.7	88.7	-47.1	0.06
Fall	422.7	276.7	-34.5	0.13
Animal	15	6.7	-55.3	0.047
Machinery injury	26.7	18.7	-30.0	0.09
FOO	11.7	5.7	-51.3	0.16
FI	9.3	12.3	+32.3	0.29
Stab injury	3	2.7	-10.0	0.36

\*T test was used to calculate the significance and p-value of  $\leq 0.05$  was considered significant.

Pre-lockdown and unlock data were compared which is shown in table 6 to see the effect of COVID-19 on pattern of injuries in trauma center. Generalized reduction was seen in all groups except physical assault, firearm injury and stab injury. Significant reduction was observed in fall and animal group with p-value of 0.004 and 0.02 respectively.

**Table 6:** Comparison between Pre-Lockdown and Unlock

MOI	Pre-lockdown (mean)	Unlock (mean)	%	p-value
RTA	644.3	582.9	-9.5	0.23
Physical Assault	106	112.7	+6.3	0.32
Fall	576	346.2	-39.9	0.004
Animal	17.3	10.1	-41.6	0.02
Machinery injury	49.3	33.8	-31.4	0.09
FOO	9	8.3	-7.8	0.41
FI	9.7	14	+44.3	0.13
Stab injury	1.7	1.9	+11.8	0.32

\*T test was used to calculate the significance and p-value of  $\leq 0.05$  was considered significant.

#### 4. Discussion

Road accidents in India kill almost 1.5 lakh people annually. Accordingly, India accounts for almost 11% of the accident-related deaths in the world. The State of Tamil Nadu recorded the highest number of road accidents (57,228) in 2019 while the highest numbers reported as killed in 2019 were in the State of Uttar Pradesh (22,655) [5]. This study demonstrated a decreasing pattern of injuries in most of the

groups during first lockdown. Among them RTA (Road traffic accidents) and machinery injury were the significant ones. This is clearly evident from the fact that there were government restrictions leading to decrease in transport and shut down of factories. Despite rising cases of physical assaults, fall of object and stab injury with increase in percentage as 58.2, 30.0, 76.5 respectively no statistically significant results were seen. This trend possibly demonstrates the psychological effects of lockdown and quarantine which caused increased fear and anger among the individuals leading to increased number of physical assaults [6]. Also, there were increased cases of domestic violence likely due to the fact that more people became jobless and resided in their homes.

As unlock started number of road traffic accidents started to increase and showed a 94.3% increase with a significant p-value of 0.04. This may be attributable from the fact that people started their work and coming towards normal life. So, there was also a 26.6% rise in cases of machinery injury. However, at that time our Trauma Centre came into the category of red zone so full return to normal activity had still not set in. This explains why some of the injury patterns like physical assault, fall, animal, etc. showed a declining trend. Our Trauma Centre covers the Purvanchal area along with parts of Bihar, Chhattisgarh, Madhya Pradesh and Jharkhand. Supposedly these cases could not come due to our place being declared as Red zone.

During the second wave of COVID-19 all hospitals including ours were overwhelmed with COVID-19 patients and people were really suffering hard from COVID-19. Our Trauma Centre was converted to a COVID care Centre. By this time government had also declared a second lockdown to reduce COVID-19 transmission. This resulted in declining trend of almost all cases of trauma with machinery injury being the significant one. Although there was a 42.1% rise in cases of stab injury but it was not statistically significant.

On comparison of change in pattern of injuries during both the lockdowns we could find that there was decrease in the number of most of the cases during Lockdown2 with road traffic accidents and firearm injuries being the exception. This may be explained by fact that Lockdown1 was sterner [7] and strict than Lockdown2 which caused least movement of vehicles and people. Also, during Lockdown2 people were suffering hard of COVID-19 with shortage of hospital beds for which they had to travel long distance to get medical attention. This might be reason of 50.4% rise in cases of RTA. Second wave of COVID was more devastating than the first one and most of the people were either affected directly or indirectly with it. Also, major hospitals and tertiary care centres including ours were filled with COVID-19 cases. This led to decrease in other pattern of cases as victims with minor injuries either did not seek medical attention or got treated nearby their locality [7].

We also compared the data from pre lockdown period (that was normally functioning Trauma Centre) to unlock period. Even in unlock period the cases were less than the pre lockdown period in most of the groups except physical assault, firearm injury and stab injury. This clearly shows the psychological effects of lockdown and COVID-19 on

people. The COVID-19 pandemic must have led to a prolonged exposure to stress which may have caused anxiousness, depression and post-traumatic symptoms in many individuals [8].

The major limitation of our study was lack of more robust psychological assessment of the patients and their attendants especially in cases of domestic violence. Other factors could be lack of community survey for proper evaluation of COVID-19 related unemployment and longer period of pre lockdown assessment.

## 5. Conclusion

There has been an overall reduction in the number of trauma patients during first lockdown with road traffic accidents and machinery injury being the significant ones. However, there was increase in cases of physical assault and stab injury. Unlocked showed rise in RTA, firearm injury and machinery injury cases while other mode of injuries declined further. Second lockdown showed further decline in trauma cases than unlocked with exception to stab injury cases. This indicates a psychological alteration in the population affected with COVID-19 and lockdown and further studies are required to evaluate this perspective. The results of this study also give a vision to the fact that more stringent road safety measure can possibly reduce the number of road traffic accidents.

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