



Original Article

## Change in spectrum of hand injuries during COVID-19 lockdown period: Increase in mixer grinder and domestic violence related injuries *in lieu* of trauma sustained in outdoor activities

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### ABSTRACT

**Objectives:** There has been a rapid increase in respiratory infections due to COVID-19, caused by SARS-CoV-2, a novel coronavirus, which is believed to have originated from Wuhan in China. The disease has taken a form of pandemic and is now present in all countries across the globe with nearly 5.4 million infections and 344,000 fatalities till date. In late March, the Indian government initiated a lockdown, which confined nearly 1.3 billion people, around one-sixth of humanity to home, in an effort to decrease the community transmission of COVID-19 disease and flatten the curve so that Indian health care is able to deal with a manageable number of cases. This lockdown, which started on March 25, 2020, has now been extended to May 17, 2020, a duration of 54 days, with further planned extension to May 31. During this lockdown, the authors noted an increase in the number of mixer grinder injuries and a change in the demography of suicidal attempts due to frustration resulting in injuries to upper limb. The authors have studied this phenomenon and compared the data with cases from previous year.

**Material and Methods:** The case records of all patients coming to the emergency department and department of plastic surgery in the period of March 25, 2020, to May 17, 2020 (54 days), with injuries of upper limb were analyzed and data compared with data from 2019. The demography and mode of injuries were studied.

**Results:** There was an unusual increase in hand injuries due to mixer grinder in kitchen, 32 cases in 54 days (17.78/month) compared to 28 cases in 12 months in 2019 (2.34/month) with  $P < 0.001$ . There was also an increase in number of intended self-inflicted injuries in upper limb, as a result of psychological effects of rage and frustration with spouse due to long periods of confinement at home (3.89/month during lockdown period compared to 0.58 during 2019,  $P < 0.005$ ) with change in demography compared to previous year. There was a decrease in upper limb injuries due to road traffic accidents, industrial accidents, assaults, sports, school, and work-related injuries, during the lockdown period, and this was along the expected lines.

**Conclusion:** The period of lockdown initiated in India, to slow the community transmission of COVID-19 caused long periods of confinement together at home for families and forced the young adults to carry out some unaccustomed work, which resulted in a spike in mixer grinder injuries of hand. It also led to some rage and frustration, especially with spouses with a spike in suicidal attempt upper limb injuries.

**Keywords:** COVID-19, Mixer grinder injuries, Self-inflicted upper limb injuries

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## INTRODUCTION

At 0000 h on March 24, 2020, a nationwide lockdown was announced by Indian government, beginning 0000Hrs on March 25, limiting the outdoor movements of one-sixth of humanity (1.3 billion Indians). The aim was to limit the community transmission of the SARS-CoV-2 virus and flatten the curve in ongoing pandemic of COVID-19 disease.<sup>[1-3]</sup> It was preceded by a 14 h voluntary public curfew on March 22 (Sunday).<sup>[4]</sup> It is a fact that India is a developing country and does not have the health-care infrastructure to deal with a large number of patients requiring hospitalization, intensive care, and ventilatory support as a result of anticipated sudden surge in COVID-19 affected individuals in the absence of preventive and social containment measures, unlike in the developed countries, namely, USA, UK, etc.<sup>[4]</sup> Therefore, prevention rather than cure, was the only possible solution for India. The nationwide lockdown restricted people from stepping out of their homes. All transport services were suspended with the exceptions for transportation of essential goods, fire, police, and emergency services. The ongoing school board examinations were postponed. Educational institutions and offices shifted to online mode and availed services such as Zoom, GoToWebinar, FreeconferenceCall for classes, and Livestorm for meetings. All physical conferences were postponed, and many shifted to online mode. Health care and other essential services and their manufacturing were exempted. Anyone who failed to follow the restrictions could expect to be prosecuted under appropriate laws.

All the residents of India were advised to stay at home. Those could start to work from home. India is a developing country, where most of the families in metropolitan cities have both husband and wife working to earn the livelihood. Some are nuclear, but most families have elderly parents staying with them. During daytime, nearly, all children are at school. Most such middle-class families stay in group housing societies, gated complexes and flats. Household work in these families is carried out mainly by part-time general duty workers, who visit a few hours in morning and/or evening to do dusting and cleaning, laundry, and cooking. Most such part-time workers stay within walking distance in low-income housing societies/shanties/huts/jhuggis in crowded areas with low sanitation.

The initiation of nationwide lockdown also restricted the movement of these household workers, as even those who stayed near the housing societies were barred entry into these complexes for the dual purpose of honoring the social distancing guidelines and avoiding the transmission of respiratory infections from crowded low sanitation areas to these societies. However, they were taken care of economically, because as per government directive, they were to be paid their salaries, irrespective of work. As a result, the burden of household work in the middle-class Indian

families fell on those, who were unaccustomed to it, namely, the husband and wife, and as far as, cooking was concerned, mainly the wife.

This sudden change in lifestyle of families took its toll mainly on the working adults. Not only did they had to carry out their office work online from home, they also had to deal with constant demands from children, who were now “always at home,” carry out the various household chores to which they were unaccustomed, as well as meet the needs of aged parents. Many ordinary tasks were made more cumbersome by epidemiological needs such as wearing masks and going out to buy groceries, standing in lines for essentials, stoppage of e-commerce and e-deliveries of routine household needs, sanitizing of all purchase with the help of isopropyl alcohol, rigorous washing of all fruits and vegetables, painstaking cleaning of all frequently touched surfaces, and the house with sodium hypochlorite-based solutions.

All this pressure combined with unfamiliarity with the kitchen gadgets and relentless unaccustomed work translated to injuries, especially those of the hand in these working adults.

## MATERIAL AND METHODS

The data were recorded from the emergency department and the department of plastic surgery of a tertiary care hospital in New Delhi. The study was approved by the hospital local ethics committee. In our hospital, the department of plastic surgery witnessed a sudden increase in finger/hand injuries due to mixer grinder during the nationwide lockdown.<sup>[5,6]</sup> Case records of all upper limb injuries including hand injuries in the lockdown period from March 25, 2020, to May 17, 2020, a period of 54 days were examined. There were a total of 32 cases of hand injuries due to mixer grinder, 7 cases of self-inflicted and intended wounds on upper limb, 4 door closing injuries of the hand, 2 cases of scald burns to hand, and 2 cases of upper limb injuries sustained accidentally at home. On the other hand, hand injuries related to road side accident and industrial accidents were conspicuous by their absence.

## RESULTS

There were 32 (68.08% of total hand injuries) cases of mixer grinder injuries to the hand. All patients were females of age group 25–35. All patients were right handed with injuries in the dominant hand. There was no case of hand injuries due to road side accident or industrial trauma in this period.

The records of emergency department also showed 7 cases (14.89% of total hand injuries) of domestic violence related hand injuries. Five of these were self-inflicted in a fit of rage when the patient smashed his dominant right hand over

a glass table or door. All five were males. The remaining two were female patients, when they incised the skin on volar aspect of their non-dominant wrist or forearm. The main wound was surrounded by parallel superficial incised wounds, typical of hesitation wounds. Both these patients were females. All these seven patients were in the age group of 35–45 years.

In addition, four cases of door closing injuries to digits (all children below 10 years), two cases of scald burns to hand, and two cases of accidental injuries to upper limb sustained at home also came during this period. These have been included in miscellaneous injuries.

Detailed history revealed that all the female patients with mixer grinder injuries were infrequent users of the machine, though they had some familiarity with the machine. While 12 patients got injured when they were cleaning the machine without unplugging it, 18 patients were injured as a result of error of judgment/precision while multitasking. Two patients were distracted as they were talking on phone held in other hand.

All these patients underwent thermal screening and quick evaluation for COVID-19 disease. However, as these were emergency cases, there was no time to wait for RT PCR test. They were presumed COVID-19 positive and taken up for surgery in operative room (OR) under monitored anesthesia care. PPE kits were worn by the surgeon and the staff and all universal precautions were taken. All injuries were at the level of finger PIP joint, thumb IP joint, or distal. After debridement, the cases in which there was exposed bone with insufficient soft-tissue coverage were treated with local, regional, adjacent flap (Atasoy/thenar/cross finger), or distant flap (groin) coverage. In cases without tissue loss, wound repair, reconstruction of fingertip, nail apparatus, and revascularization or replantation were done as per the need. The fractures were fixed with K wires. In case of severe/multiple wounds with devitalization, shortening and closure of stump was done. The aim of the treatment was coverage of wounds with provision of painless and sensate fingertip with good IP and MP joint motion [Tables 1 and 1a].

In cases, five male patients, who sustained wounds by smashing their dominant right hand against glass table or doors, all patients had multiple lacerations in hand and forearm. Three patients had additional tendon injuries, which were repaired. Two of the five patients also sustained injuries to elbow and upper arm region with brachial artery injury. The median nerve was also injured in one patient. All these injuries were repaired primarily and the upper limbs were dressed and splinted in position of elbow flexion. The two female patients with injuries to non-dominant wrist and forearm had multiple parallel lacerations. In one of these, the palmaris longus tendon was found divided. All injuries and the tendon were repaired. The miscellaneous injuries were also dealt with as per protocol.

## DISCUSSION

This is the first case series reporting the impact of lockdown on pattern of hand injuries coming to a tertiary care hospital in a third world country. The data were analyzed using SPSS software version 25.0.

### Statistical analysis

Descriptive analysis was carried out. Categorical data were presented in number and percentages. Chi-square test was applied for group comparisons.  $P < 0.05$  was considered as statistically significant [Table 2].

There were 32 female patients with mixer grinder injuries to the hand during the lockdown period of 54 days, which translates to 17.78/month and accounted for around 68% of total hand injuries. This was a significant increase compared to 2019, when in entire 1 year, there were only 28 patients with mixer grinder injuries, which translates to 2.34 cases/month and constituted 13.4% of total hand injuries ( $P < 0.001$  and hence statistically significant). A number of males were 2 (7.14%) and females, 26 (92.8%). Eighteen were in the age group of 25–35 years and 10 were in the age group of 36 years and above. All patients were right handed with the dominant hand involved in all cases. There were also 7 (3.35%) cases of intended self-inflicted injuries of upper limb due to psychological issues because of domestic confinement resulting in violence. This accounted for 14.89% of total hand injuries and averages around 3.89/month. In 2019, there were seven similar cases in entire year, which translates to 0.58 cases/month and accounted for 3.35% of all hand injuries. All the seven cases of intended self-inflicted injuries of 2019 came in the period March–May 2019, were students of class 10<sup>th</sup> and 12<sup>th</sup> between ages 16 and 19 years, five females and two males. In all cases, the non-dominant left wrist and forearm showed typical incised wound surrounded by parallel shallower hesitation marks typical of such injuries. Hence, in the lockdown period, there is a significant change in the demography of such injuries in terms of age range (35–45 years vs. 16–19 years in 2019), reason (psychological stress and friction due to domestic confinement vs. stress of poor performance at examinations),<sup>[7]</sup> and numbers (3.89/month vs. 0.58,  $P < 0.002$ , and hence, statistically significant) [Table 3].

The World Health Organization (WHO) has also noted that cases of domestic related violence across the globe have seen a spike amidst lockdowns. The Director-General of WHO has asked countries to take measures to curb the menace of domestic violence.<sup>[8–10]</sup>

There were also four cases of door closing injuries in children, two cases of scald-burns, and two cases of accidental injuries to upper limb at home. These have been grouped as miscellaneous injuries. These accounted for 17.02% of total lockdown period injuries and averaged 4.44/month.

**Table 1:** Case wise treatment for mixer grinder injuries is tabulated here.

Cases	Digits involved: Single/multiple	Level of injury	Fracture	Amputation	Treatment given
Case 1	Multiple	PIPJ in index and middle	Yes	Distal phalanx of ring finger	Suturing of laceration and replantation of distal phalanx of ring finger
Case 2	Multiple	DIPJ of index and middle	Yes	No	Suturing
Case 3	Multiple	DIPJ of index, middle and ring	Yes	No	Suturing
Case 4	Multiple	DIPJ of ring and little	Yes	No	Debridement and suturing
Case 5	Multiple	DIPJ of index and PIPJ of middle	Yes	Yes, distal phalanx of index	Suturing of middle finger and thenar flap for index
Case 6	Single	PIPJ and DIPJ of index	Yes	No	Suturing
Case 7	Multiple	DIPJ of middle and ring	No	No	Suturing
Case 8	Multiple	DIPJ of index, middle and ring	No	No	Suturing with Atasoy flap for index finger
Case 9	Multiple	Pulp of index and middle	No	No	Suturing
Case 10	Multiple	DIPJ of index and middle	No	No	Suturing
Case 11	Multiple	IPJ of thumb and DIPJ of index	Yes	No	Suturing
Case 12	Single	Little finger DIPJ with ring avulsion of soft tissues of PIPJ	Yes	Yes	Groin flap
Case 13	Single	Index finger pulp laceration	No	No	Suturing
Case 14	Multiple	Index and middle	Yes	No	Suturing
Case 15	Single	Index amputation at PIPJ	Yes	Yes	Stump closure with local flaps
Case 16	Single	Middle finger distal to DIPJ	Yes	Yes	Suturing
Case 17	Single	Index	No	No	Debridement and suturing
Case 18	Single	Index	No	No	Suturing
Case 19	Single	Index	No	No	Suturing
Case 20	Single	Ring	No	No	Debridement and Atasoy flap
Case 21	Multiple	Index, middle DIPJ	Yes	Yes	Suturing of flaps
Case 22	Multiple	Index distal to DIPJ and middle pulp	Yes	No	Suturing of index and middle fingers
Case 23	Multiple	DIPJ of middle and ring	No	No	Suturing
Case 24	Multiple	DIPJ of index, middle and ring	No	No	Suturing
Case 25	Single	Index finger distal to DIPJ	No	No	Suturing
Case 26	Single	Ring and little fingers	Yes	Yes	Suturing of wound
Case 27	Single	Distal phalanx of index finger	Yes	Yes	Cross finger flap
Case 28	Single	Thumb	No	No	Suturing
Case 29	Multiple	DIPJ of index and middle	No	No	Suturing
Case 30	Single	Index finger distal to PIPJ	Yes	Yes	Suturing
Case 31	Single	Middle finger distal to DIPJ	Yes	Yes	Thenar flap
Case 32	Multiple	Index finger distal to DIPJ, middle distal to PIPJ	No	No	Suturing

PIPJ: Level of injury from proximal interphalangeal joint level, to distal interphalangeal joint, DIPJ: Level of injury at distal interphalangeal joint and distal, IPJ: Level of injury at interphalangeal joint of thumb and distal.

**Table 1a:** Summary.

Patient parameters number of patients	Single digit injury	Multiple digit injuries	Amputation and stump closure	Fingertip/laceration repair	Adjacent/cross finger/thenar/groin flap coverage	Replantation
32	15	17	10	32	8	1

When compared with 2019 (41.63% of total and averaging 7.25/month), there was a statistically significant decrease in

incidence of such injuries ( $P < 0.002$ ). We used to receive a fair number of children with hand injuries sustained at school and



**Table 2:** Result analysis.

Mechanism of injuries	Pre-lockdown period (Year 2019) (%)	Lockdown period of 54 days	P-value
Mixer grinder kitchen gadget	28 (13.40)	32 (68.09)	<0.001
Industrial accidents	46 (22.01)	0 (0)	<0.001
Road accidents	41 (19.62)	0 (0)	<0.001
Intended and self- inflicted	7 (3.35)	7 (14.89)	0.002
Miscellaneous injuries	87 (41.63)	8 (17.02)	0.002
Total	209	47	

**Table 3:** The difference in etiology and frequency of injuries in the lockdown period and in previous year.

Mechanism of injuries Numbers (percentage)	Mixer grinder kitchen gadget	Industrial accidents	Road accidents	Intended and self-inflicted	Miscellaneous (door closing injuries, burns, accidental injuries at home [lockdown], school, college, assaults, etc.) (2019).	Total
In 1 year (2019)	28 (13.40%)	46 (22.01%)	41 (19.62%)	7 (3.35%)	87 (41.63%)	209 (100%)
Monthly average (2019)	2.34	3.83	3.42	0.58	7.25	17.42
In lockdown period (54 days)	32 (68.09%)	0	0	7 (14.89%)	8 (17.02%)	47 (100%)
Monthly average (lockdown period)	17.78	0	0	3.89	4.44	26.11

sports related injuries in students, as well as injuries related to disputes and assaults. There was an expected decline in these events during the lockdown period. No cases of hand injuries due to road side accidents were noted during this period of 54 days (41 injuries in 2019, 19.62% of total, averaging 3.42/month versus 0 in lockdown period), a statistically significant decrease ( $P < 0.001$ ), as it was a period of complete lockdown with minimal road traffic, and all industries were closed. Same applied to the industrial hand injuries (46 cases [22.01%]) which translate to 3.83 cases/month versus 0 during the lockdown period ( $P < 0.001$ ).

Our study reveals the differential pattern of hand injuries in lockdown, both in relation to demographic and clinical scenarios as compared to the previous year. This poses new challenges both to clinicians and social health workers.

#### Preventive measures suggested by the author

Kitchen mixer grinder is a device, which has the potential to cause severe injuries to hand, especially digits. Hence, one should not be complacent while working on it, and avoid unnecessary distractions, especially mobile phones and multitasking. It could still be made safer. To this end, a modification suggested by the author in the mixer grinder is the spring action switch on/off push button to regulate the blades of the grinder. With this modification, the machine is only active as long as the button is mechanically pressed by fingers. The moment finger is removed from the button, the blades stop. This modification will demand increased and

continual concentration from the operator and hence reduce the chances of injury.

Second, there was increase in domestic violence cases leading to self-inflicted wounds over upper limb. These were due to friction and quarrel with spouse as a result of lockdown. Recommendation of earlier intervention by mental health professional through teleconsultation could be a possible solution for the prevention of such injuries. Moreover, media should emphasize this issue and publicize methods such as meditations, yoga, participation of all family members in various chores, and activities.

#### CONCLUSION

During part of the lockdown period from March 25, 2020, to May 17, 2020, there was a spike in domestic mixer grinder injuries sustained while doing unaccustomed cooking work. Injuries were due to unfamiliarity with machine and task, lack of concentration, complacency, distraction by mobile device, and multitasking. Such injuries with associated morbidity are easily avoidable if due precautions are taken.

Second pattern change in lockdown period was a demographic change in suicidal attempt injuries sustained on non-dominant wrist. While earlier, these injuries were a result of anxiety due to poor performance in examinations in school-going students (age group 16–19 years), during the lockdown period, similar injuries occurred as a result of rage and frustration and conflict with the spouse in older age group (35–45 years) due to confinement at home and

constant friction for long periods as a result of lockdown. The clinicians should be aware of these patterns as these could well be the new normal in the coming months. There was a decrease in injuries sustained due to assaults and conflicts, sports, school, and work activities, and this was along expected lines. In addition, no patients with hand injuries due to road traffic accidents or industrial accidents presented at our center during the lockdown period. This could be due to the preventive/protective effects of lockdown. This study is limited by the small number of patients. The psychological impact of lockdown and related mental health issues will need to be evaluated on a larger database.

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Patient's consent not required as patients identity is not disclosed or compromised.

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### Conflicts of interest

There are no conflicts of interest.

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