

ORIGINAL RESEARCH

**TO EVALUATE LOCKDOWN EFFECTS ON PEDIATRICS  
ORTHOPEDIC TRAUMA EPIDEMIOLOGY BEFORE,  
DURING AND AFTER COVID-19 PANDEMIC IN A  
TERTIARY HOSPITAL- AN OBSERVATIONAL STUDY**

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**ABSTRACT**

**Background:** Corona pandemic and its resultant lockdown have caused a devastated effect of life of human beings. We conducted this study during Covid-19 period to analyze the effects of lockdown on pediatric trauma variations in injury pattern and its severity among children in a tertiary hospital.

**Materials and Methods:** Patients of less than 16 year presented to orthopedic trauma were defined in this study. The study has been divided into three time periods. Patients presented from March 2019 to July 2019 (base line period), March 2020 to July 2020 (Lockdown period) and March 2021 to July 2021 (post lockdown period) were identified and compared in this retrospective cross sectional study. The children included in this study were either requiring manipulation under anesthesia or surgical intervention in operation theatre. We conducted unadjusted bivariate analyses of injury patterns during these periods. Segmented linear regression models were used to evaluate the rates of injuries before, during and after pandemic period. The one way analysis of variance (ANOVA) was used to evaluate the differences in means of three independent groups.

**Results:** A total of 231 numbers of children with orthopedic trauma were presented to our tertiary hospital. Out of these, 111 were admitted during pre-pandemic period and 45 in the pandemic period with 75 children during post pandemic period. During lockdown period, mean age of children with significant orthopedic trauma has decreased to 7.5 years in comparison to base line which was about 8.5 years and post lockdown period 9.25 years. Boys outnumbered the girls during this study. The outdoor injury has drastically decreased from 65.75% in base line to 35.65% in lockdown period, but this pattern has increased to 85.25% in post lockdown period.

**Conclusion:** Our study has shown that during lock down in Covid pandemic, there was a decrease of 59.46% cases of pediatric trauma patients in which surgical intervention

**or manipulation in operation theatre was required. These changes in epidemiology may be due to modified approach followed by surgeon while following strict Covid guidelines. Our study has also mentioned increase in domestic injuries requiring surgical intervention which may be due to lock down implications by national protocols. We recommend to create a safe environment for children during indoor and outdoor activities and creating awareness among parents to safe guard their siblings. All above these measures may reduce the burden on health care facilities.**

**Keywords: Paediatrics, Orthopedics, covid-19, epidemiology**

## **INTRODUCTION**

Corona pandemic has effected almost all countries of the world. This was caused by the severe acute respiratory syndrome corona virus 2 (SARS cov-2). It has spread globally and producing devastated effects and crippled the human life.<sup>[1]</sup> This has also affected front line workers leading to facing severe resource crunch in health care system, especially in third world countries. All affected countries have resorted to put a nationwide lockdown to control its spread and save the human lives.<sup>[2]</sup> The third world countries, like India was not an exception for the same. The Government of India has started nationwide lockdown in March 2020 to curtail spread of this pandemic. During declared lockdown all recreational activities and sports along with schools were shut down. There were specific guidelines for social distancing as well as travel restrictions to prevent its spread.<sup>[3,4]</sup> All closed facilities were associated with various pediatric injuries,<sup>[5]</sup> among children. The closure of these has led the children to indoor activities and prone those to domestic injuries. We conducted this study to analyze the impact of this lockdown on epidemiology of pediatric orthopedic trauma which were requiring surgical interventions. In this study, we investigated the epidemiology of pediatric trauma before, during and after the lockdown period to corroborate the findings of epidemiology of pediatric injuries in their corresponding time frame. In corona period, the human life has come to stand still and become miserable. GOI has issued strict restrictions and guidelines for outdoor activities and travelling among inter and intra cities. Covid protocol has make sports activities inaccessible and inapplicable among young and children. During this period people were used to refrain from outdoor, but bound to indoor activities. Children have started indoor sports activities and suffer domestic injuries. All health care workers were involved in dealing with Covid patients especially, but trauma patients were mainly managed conservatively or non-surgically and only emergent patients has been underwent surgical interventions in operation theatres. All institutions have followed their respective government guidelines or meticulous strategies to tackle the pre-operative, intraoperative and post-operative periods. Keeping in view the safety, effectiveness and rapidly management of these pediatric trauma patients, where possible, there was a tendency of all centres to manage these patients conservatively.

## **MATERIALS & METHODS**

This retrospective cross sectional study was conducted after approval from institute ethical committee. This study done to evaluate the effects of lockdown period from March 2020 to July 2020 on pediatrics trauma epidemiology in age group of 0-16 years in a tertiary hospital. During this study, we have compared the children admitted in our hospital requiring surgical

intervention in operation theatre under anesthesia of a pre-epidemic period (March 2019 to July 2019) which was considered as baseline with the similar duration in post lockdown period ( March 2021 to July 2021). So, during this study we have compared the epidemiology of pediatric orthopedic trauma in these three study periods i.e baseline, lockdown and post lockdown. Children with significant trauma like fractures or soft tissue injury, which were admitted and managed with manipulation or surgical intervention in operation theatre under anesthesia, were included in this study. Children with injuries other than orthopedics like surgical or with pathological fractures were excluded from this study. All patients' data like demographics, location, and mechanism with nature of injury were collected from hospital registry. The record showing incomplete data of patients were excluded from study.

**Statistical Analysis:** Microsoft Excel was used to compile and tabulation of data. The simple descriptive and categorical data in percentage were analyzed. The one way analysis of variance (ANOVA) was used to evaluate the differences in means of three independent groups. Chi square test was used to evaluate the differences in categorical data and proportion was compared by Fischer test if the values in the cells were more than 5. A statistical value of  $P < 0.005$  was considered as significant.

## RESULTS

During this study, among all pediatrics orthopedic trauma patients, 02 clavicle fractures in baseline and 01 in post lockdown period were not included in either manipulation or surgical intervention category. Among these patients which had required intervention, lockdown period has shown reduction in 59.46% of cases as compared to baseline and post lockdown period. During this study, the mean age of patients in lockdown was 7.5 years in comparison to baseline period of 8.5 years, which shows a drop in the age due to less outdoor activities among these patients. During post lockdown there was rise in age of patients who require surgical intervention under anesthesia to 9.2 years in comparison to base line. [Table 1] During all the three periods, this study has shown an increase in orthopedic trauma in boys as compared to girls. [Table 2] This trend may be attributed to prevalence of increase in outdoor activities in boys in comparison to girls. During lockdown period, there is a decrease in outdoor activities of these children, which has led to decrease in incidence of outdoor injuries in this period of about 37.78% as compared to baseline period. These injuries suddenly increase in number to 82.67% in comparison to baseline of 67.57% during post lockdown period. In lockdown period, there was relative increase of indoor injuries i.e domestic trauma to 62.22% during this period, which require surgical intervention among these patients. [Table 3] There was subtle increase in soft tissue injuries during lockdown period as compared to baseline and post lockdown periods, but fracture requiring surgical intervention remained almost the same. [Table 4] In this study, during all three time periods, had shown upper limb trauma as the most common injuries having about 72.06%, 66.67% and 70.66% in their respective time periods. Among these regional injuries, forearm was most commonly involved in trauma in these pediatric patients throughout all these study periods. [Table 5]

**Table 1: Age distribution of children in study period**

Group	Baseline	Lockdown	Post lockdown	P-value
Number	111	45	75	
Mean Age (years) with SD	8.5	7.2	9.2	

**Table 2: Gender distribution of patients in study periods**

Gender	Baseline	Lockdown	Post Lockdown	P-value
Male (n/%)	85 (76.57)	28 (62.22)	58 (77.33)	
Female (n/%)	26 (23.43)	17 (37.78)	17 (26.67)	

**Table 3: Location of injury in study periods**

Location	Baseline	Lockdown	Post lockdown	P-value
Indoor (n/%)	36 (32.43)	28 (62.22)	13 (17.33)	
Outdoor (n/%)	75 (67.57)	17 (37.78)	62 (82.67)	

**Table 4: Type of injury in study periods**

Type	Baseline	Lockdown	Post lockdown	P-value
Soft tissue	10 (9.01)	5 (11.11)	11 (14.67)	
Fracture	101 (90.99)	40 (88.89)	64 (85.33)	

**Table 5: Regional distribution of paediatrics injuries**

Region	Baseline (n/%)	Lockdown (n/%)	Post lockdown (n/%)	P-value
Clavicle	2 (1.80)	0	1(1.33)	
Elbow	24 (21.62)	4 (8.89)	17 (22.67)	
Forearm	31 (27.93)	11 (24.44)	19 (25.33)	
Phalanx	3 (2.70)	4 (8.89)	3 (4)	
Nail bed	20 (18.01)	9 (20)	13 (17.33)	
Pubic ramus	0	0	0	
Femur	7 (6.31)	3 (6.67)	5 (6.67)	
Tibia	9 (8.11)	4 (8.89)	4 (5.33)	
Ankle	3 (2.70)	2 (4.44)	1 (1.31)	
Foot	2 (1.80)	1 (2.22)	1 91.33)	
Soft tissue	10 (9.01)	7(15.55)	9 (10.67)	

**Table 6: Type of procedure done in study periods**

Procedure	Baseline (n/%)	Lockdown (n/%)	Post lockdown (n/%)	P-value
MUA & Plaster	19 (17.12)	8 (17.77)	13 (17.33)	
Pinning / ORIF	60 (54.05)	20 (44.44)	38 (50.67)	

Nail bed repair	20 (18.02)	9 (20)	16 (21.33)	
Wound exploration and closure	10 (9.01)	7 (15.55)	8 (10.67)	

02 clavicle fracture excluded in baseline and 01 in post lockdown period.

## DISCUSSION

Corona pandemic has crippled the whole world with resultant effects or implications on human life. Accordingly, during this pandemic period the treatment and management protocols has changed to control and manage the injured patients during emergency hours.<sup>[6,7]</sup> Government of India has issued necessary guidelines for managing these patients. Orthopedic surgeons have adopted meticulous strategies to treat and manage these injured during intra-operative and post-operative periods. Corona pandemic has diverted the said patient load to public hospitals rather than private clinics.<sup>[8]</sup> Some of these institutions has preferred to conservative or nonsurgical management of these injuries.<sup>[9]</sup> Our institute, being a tertiary level centre, has followed the operative guidelines issued by Government of India or ICMR (Indian Council of Medical Research). During this pandemic period, keeping in view the safety, efficacy and rapidly managing of these injured patients; non-emergent or elective cases were deferred or managed conservatively. Non-operative treatment, where ever possible, is considered as preferred management during this pandemic. Emergency or trauma cases were given utmost priority according to the Covid protocol.<sup>[10]</sup>

Our study had shown that during lockdown period there was a decrease of 59.46% cases of pediatric orthopedic trauma cases which were requiring the surgical intervention or manipulation in the operation theatre. This has attributed to the issued national guidelines of social distancing measures or quarantine at home or isolation of contact persons in home and complete shutdown of outdoor activities. All these measures and protocols have resultant effects in behavior modification of people or they were adopted to these measures and guidelines. Outdoor activities were very negligible due to strict travel restrictions, closure of schools and sports centers.<sup>[11]</sup> These has led to resultant effects of significant reduction in outdoor activities. There was a fear among peoples to acquire the Covid-19 infection on visiting a hospital; this dilemma has led to less attendance in hospitals. Non-surgical approach towards emergency trauma cases in hospitals may be the reason behind this less number of pediatrics trauma cases. But this has to be quantified. This decrease in number of pediatrics operative trauma cases has been also reported in other countries.<sup>[12,13]</sup> In a study conducted by Nabian et al, there was a reduction of 50% in emergency trauma patients however, a reduction 73% was reported in emergency cases in Italy.<sup>[14]</sup>

Our study has shown decrease in mean age of children sustaining these injuries from 8.5 years (baseline) to 7.2 years during lockdown period. But, during post lockdown period this has increased to 9.5 years, which was quite high as comparative to baseline period. Bolzinger et al. in his study has reported a mean age of 7.5 years during lock down period as compared to baseline of 9.2 years. In a another study by Bram et al. these was decrease in mean age of 7.5 years and 9.4 years during lockdown and baseline periods respectively.<sup>[6]</sup> These studies

has shown a general decrease in mean age of these pediatric orthopedic trauma cases during lockdown period.<sup>[15]</sup>

Our study has reported a decrease in high energy injuries during lockdown period of Covid pandemic period to 37.78%, which may be due to less number of road traffic accidents, outdoor activities as well as sports injuries. But, these injuries suddenly increase in post lockdown period to 82.67% as compared to 67.57% of baseline period. Christey et al has also reported an increase in indoor as well as farm related injuries during lockdown period.<sup>[12]</sup> There was overall decrease in trauma cases which were attending hospitals during this period. Our study has also shown the same changes in location of injuries, these may be due to the resultant effects of Covid guidelines during lockdown period. In our study there was increase in incidence of domestic injuries of 62.22% as compared to 37.78% during lockdown period. On contrary, the outdoor and sports injuries has decreased significantly during lockdown period to 37.78% from 67.57% of baseline period. This increase in domestic injuries may be due to lack of parental supervision of fatigue from continued vigilance among children. Palmer et al in his study has also reported the same incidence of domestic injuries in lockdown period.<sup>[16,17,18]</sup>

During our study there was slight increase in injuries with fall from bed side, but this was not statistically significant. These may be due to increase in indoor activities of children or mostly staying indoors during study periods. Bolzinger et al in his study has reported increase in trampoline related injuries during lockdown.<sup>[6]</sup> But the incidence of other injuries remain the same in all three periods of study. During our study there was also increase in injuries about 37.78% among girls during lockdown as compared to 23.43% of baseline period. Post lock down nature of injuries of 26.67% was comparable to base line in girls. However these were not statistically significant. The boys have dominated in incidence of injuries in these baseline, lockdown and post lockdown periods.

During this study, we have compared different procedures adopted by the surgeon to deal with these injuries. Among various procedures for the treatment of these injuries, the open reduction and fixation with pinning (54.05%) was done most commonly in children during and soft tissue procedures like wound exploration, and closure were less commonly (9.01%) performed during base line period. However, during lock down period soft tissue has increased to 15.15%, which were statistically significant. (p-0.04). This may be correlated with increase in indoor injuries during lock down period. Post lock down soft tissue injuries were comparable to base line injuries.<sup>[19,20,21]</sup> During this study, we have found that there was a change in pattern, number of fractures and increase in soft tissue injuries during lock down period. These findings of study have suggested that lockdown was associated with change in epidemiology or overall pattern of injuries among children.

## CONCLUSION

Our study has shown that during lock down in Covid pandemic, there was a decrease of 59.46% cases of pediatric trauma patients in which surgical intervention or manipulation in operation theatre was required. These changes in epidemiology may be due to modified approach followed by surgeon while following strict Covid guidelines. Our study has also mentioned increase in domestic injuries requiring surgical intervention which may be due to lock down implications by national protocols. We recommend to create a safe environment

for children during indoor and outdoor activities and creating awareness among parents to safe guard their siblings. All above these measures may reduce the burden on health care facilities.

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