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Research Article

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Study the Impact of COVID-19 on Epidemiology of Orthopedic Related Trauma

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ABSTRACT

Background: The orthopaedic trauma cases during the lockdown period changed from being frequent, high-energy, and potentially fatal car and road accidents to being low-energy, household, and general injuries such as falls, fractures in children (especially in older patients), cuts from sharp objects, and nail bed lacerations. The subsequent article determines the influence of COVID-19 on orthopaedic surgeries and their epidemiology during the lockdown in many countries.

Methods: This observational study was conducted at a tertiary care center, India's Medical College, using hospital records to validate admissions and discharges. Patients visiting the orthopedic emergency room with new injuries for tertiary care were included. Patients referred from other departments or for follow-up were excluded. Patients were categorized based on COVID-19 lockdown phases. Data collected included demographics and trauma-related information. The study, being database-based with no identifiable patient data, didn't need formal ethical approval.

Results: The study compared fracture rates between a 2020 epidemic group and a 2019 control group. Statistical analysis revealed no significant differences in fracture rates during each assessment stage. However, considering the entire assessment period, the epidemic group had significantly fewer fractures than the control group. Demographic data and fracture patterns were analyzed, with "n.s." indicating no significant differences between groups. Despite some age and fracture site variations, many characteristics remained consistent between the epidemic and control groups.

Conclusion: Even though there were few orthopedic-related fractures during the pandemic. The present study has concluded that a significant death rate resulted from treatment delays.

Key-words: Community, Epidemiology, Orthopedic trauma, COVID-19, World Health Organization

INTRODUCTION

The study of epidemiology aims to ascertain the impact of illnesses on the general population as well as health consequences. In epidemiology, patients are seen in the community and people in groups. Epidemiology is the scientific, methodical, and data-driven study of the patterns or frequency (distribution) of illnesses, health-related occurrences, and conditions in specific populations (schools, communities, states, cities, countries, or the globe), as well as the risk factors and causes (determinants). The purpose of this study is to control health difficulties [1].

The world was shocked by the unique and highly contagious COVID-19 coronavirus, and the World Health Organisation promptly proclaimed it a worldwide epidemic or pandemic. To stop the spread of illness, governments, and health-care organizations from all over the world have implemented stringent lockdowns in several nations. The Indian government imposed a brief countrywide lockdown starting on March 24, 2020. Phased restoration of the services began on June 1, 2020, with "unlock 1" being the first. The lockdown had caused a discernible reduction in movement in the

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general population, and it was anticipated that this would have an impact on the epidemiology of trauma connected to orthopaedics [2]. We examined the consequences of COVID-19 and its limitations.

Orthopaedic trauma comprises significant damage to the muscles or skeleton brought on by external force, such as a vehicle accident, slip and fall, or traffic incident. Although these injuries typically do not result in death, they can nonetheless have an impact on daily life [3]. A competent orthopaedic physician is necessary for certain injuries, whereas an emergency room visit is not necessary for others. When an external force is applied to joints, bones, and soft tissues, orthopaedic trauma occurs [4]. Orthopaedic injuries such as tibial stress fractures and tiny cracks in the lower leg can also result from long-distance running. Therefore, orthopaedic trauma is a general phrase that encompasses a variety of injuries ranging from minor breakages to fatal mishaps. To heal broken body parts as soon and effectively as possible, orthopaedic surgeons specialise in treating a variety of injuries [5].

Physical aggression, falls, auto or motorcycle accidents, natural catastrophes, and sports-related injuries are common causes of orthopaedic trauma [6]. A few others are also more prone to injuries than others, such as older individuals with osteoporosis. This condition causes the body to lose bone density and increases the risk of bone breaking in a fall compared to young adults. Orthopaedic injuries also occur often. Orthopaedic trauma is not life-threatening, yet it still requires medical attention. Physicians that specialise in orthopaedic trauma may handle a variety of common injuries, including stress fractures (a tiny split in the bone), dislocations (any joint that comes out of its place), open fractures (when skin is damaged by a broken bone), and closed fractures (when a broken bone does not break skin) [7,8].

MATERIALS AND METHODS

Research Design- This observational study was conducted in a tertiary care hospital called Medical College in India. The information obtained from the hospital records department was used to validate the daily hospital admission and discharge records from wards and emergency rooms. The study's inclusion criteria were satisfied by every patient sent for tertiary-level care or who showed up in the orthopaedic emergency room with fresh injuries. Patients referred from other departments within our organisation or making follow-up presentations were not included in the research.

Pre-lockdown patients (those hospitalized before March 2020), lockdown patients (those admitted between March 1 and April 31, 2020), and post-lockdown patients (those admitted on May 1 or after) were the three categories of patients depending on the evolution of the COVID-19 epidemic.

They provided their demographic information (age, gender, and residential address) and epidemiological characteristics linked to trauma (anatomical location, kind, and pattern of injuries, including fractures (open or closed), dislocations, and soft tissue injuries). Because the study was only a database-based observational study with no revealed identifiable patient data, it did not require formal institutional ethical approval. Those with a history of fracture signs and injuries were requested to have their body temperatures checked before the evaluation, and any concerning symptoms (including fever, coughing, or respiratory issues) were noted. If the patient had come into touch with a COVID-19-positive person in the previous 14 days, either directly or indirectly, or had symptoms that were in line with the virus [9,10]. All patients underwent detailed interviews on their traumatic past. In cases where the patient's history or clinical symptoms did not correspond with the COVID-19 virus, any required imaging tests were carried out. Routine laboratory tests, liver and kidney function tests, coagulation indicators, and extra imaging investigations (chest X-ray or chest computed tomography) were carried out if the suspicion of a fracture was verified and hospitalization for surgical treatment was necessary. In addition, an oropharyngeal swab was used in a polymerase chain reaction (PCR) test to identify COVID-19. Until these tests were completed, the suspected patient was held alone in an isolation unit [11,12].

Inclusion Criteria

- ✓ Patients sent for tertiary-level care or presented in the orthopaedic emergency room with fresh injuries.
- ✓ Patients admitted to the Medical College tertiary care hospital in India.
- ✓ Patients admitted during the specified periods: pre-lockdown (before March 2020), lockdown (March 1

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to April 31, 2020), and post-lockdown (May 1 or after).

- ✓ Patients, who provided demographic information (age, gender, and residential address) and trauma-related epidemiological characteristics.
- ✓ Patients with suspected fractures, dislocations, or soft tissue injuries.
- ✓ Patients willing to undergo body temperature checks and screening for COVID-19 symptoms, including fever, coughing, or respiratory issues.
- ✓ Patients, who had come into contact with a COVID-19 positive person in the previous 14 days or exhibited symptoms consistent with the virus.

Exclusion Criteria

- ✓ Patients referred from other departments within the same organization.
- ✓ Patients making follow-up presentations.
- ✓ Patients with a history of fracture signs and injuries who refused to undergo body temperature checks or COVID-19 screening.
- ✓ Patients with clinical symptoms suggestive of COVID-19 but whose history or clinical symptoms did not correspond with the virus and refused further evaluation or testing.
- ✓ Patients who did not consent to detailed interviews regarding their traumatic past or refused additional imaging tests when deemed necessary.
- ✓ Patients who did not undergo routine laboratory tests, liver and kidney function tests, coagulation indicators, or imaging investigations when deemed necessary for fracture confirmation and surgical treatment planning.
- ✓ Patients who refused oropharyngeal swab testing for COVID-19 using polymerase chain reaction (PCR).

Statistical Analysis- The Statistical Package for Social Sciences Software for Windows (SPSS), version 21 from IBM Corp., NY, USA, was used for analysis. All the data was compiled into a Microsoft Excel file. The Chi-square test was used for the cross-tabulation evaluation. The unpaired t-test and one-way ANOVA were used to compare the means of two or more groups. P-values were considered statistically significant if they were less than 0.5.

Ethical Approval- The study obtained ethical approval from the hospital's Ethical Committee (Govt Medical College, Sundargarh, India).

RESULTS

Table 1 presents the number of fractures observed during each assessment period cluster for the epidemic group in 2020 and the control group in 2019, along with the proportional variations and associated p-values. In the pre-lockdown phase, the epidemic group had 14 fractures compared to 20 in the control group, showing a slight increase of 4.3%, which was not statistically significant (n.s.). During the lockdown phase, the epidemic group had 16 fractures, while the control group had 30, indicating a notable decrease of 32.9%, again not statistically significant (n.s.). Similarly, in the post-lockdown phase, the epidemic group had 30 fractures compared to 40 in the control group, with a slight increase of 4.9%, also not statistically significant (n.s.). Overall, when considering the total fractures across all assessment periods, the epidemic group had 60 fractures, while the control group had 90 fractures, resulting in a significant decrease of 8.6%.

Table 1: Quantity of fractures for every assessment period cluster and the proportional variations between the two research groups

	Epidemic group (2020)	Control group (2019)	Difference	p-values
Pre lockdown	14	20	+4.3%	n.s.
Lockdown	16	30	-32.9%	n.s.
Post lockdown	30	40	+4.9%	n.s.
Total	60	90	-8.6%	

p-values less than 0.05 were deemed statistically significant. n.s.: not important

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Table 2 presents comprehensive demographic data, fracture patterns seen in the epidemic group (2020) compared to the control group (2019), and a relative statistical comparison of the two research groups. The "n.s." denotes the absence of statistically significant differences for the specified parameters between the groups. Overall, the epidemic and control groups differed significantly in terms of mean age and some fracture sites. However, several demographic and clinical factors did not differ significantly between the two groups.

Table 2: Demographic details and patterns of fractures, with relative statistical comparison

Parameter	Epidemic group (2020)	Control group (2019)	p-values
GENDER			
Female	40 (66.7%)	62 (68.9%)	n.s.
Male	20 (33.3%)	28 (31.1%)	
MEAN AGE	73.7 ± 19.9	67.8 ± 26.9	0.0444
EMERGENCY DEPARTMENT- ADMISSION TIME LAPSE	0.9 ± 0.8	0.9 ± 0.7	n.s.
LENGHT OF STAY	12.8 ± 9.0	8.7 ± 8.8	n.s.
FRACTURES LOCATION			
Clavicle	0	2 (2.2%)	n.s.
Scapula	1 (1.7%)	0	
proximal humerus	4 (6.6%)	10 (11.1%)	
humerus shaft	1 (1.7%)	4 (4.4%)	
Elbow	4 (6.6%)	2 (2.2%)	
radius and/or ulna shaft	1 (1.7%)	2 (2.2%)	
Wrist	1 (1.7%)	4 (4.4%)	
Hand	1 (1.7%)	0	
pelvis/acetabulum	5 (8.3%)	1 (1.1%)	
proximal femur	22 (36.7%)	32 (35.6%)	
femur shaft	5 (8.3%)	4 (4.4%)	
distal femur	0	1 (1.1%)	
Patella	2 (3.3%)	3 (3.3%)	
proximal tibia	3 (5%)	2 (2.2%)	
tibia shaft	3 (5%)	4 (4.4%)	
Ankle	4 (6.6%)	15 (16.7%)	
Foot	3 (5%)	4 (4.4%)	

*p<0.05 is the level of significance; n.s, Not Significant.

DISCUSSION

The impact of the COVID-19 lockout on the epidemiology of orthopaedic trauma cases in global health-care systems has been elucidated in this study. Numerous books about COVID concentrate solely on the virus itself. However, there aren't much research that concentrates on this pandemic's epidemiology. Since fractures represent a significant cost to society and the health-care system, they merit special consideration [13-15]. The main outcome of this study implies that the epidemiological patterns in orthopedic patients have been altered by this outbreak [15,16].

Past studies have shown that the impact of COVID-19, including a decrease in trauma cases, and due to lockdowns, there was 90% reduction in orthopedic-related trauma. This occurred due to lockdowns, non-urgent traffic, reduced vehicles on the road, and the absence of events like sports events. However, the reports show a substantial increase in home-related injuries [17-20]. There was a delay in seeking medical attention during the pandemic times. People could not

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get to medical facilities quickly due to lockdowns or fear of contracting COVID-19 [21]. During this time, elective surgeries were intentionally not done by the surgeons. A troubling pattern that emerged throughout the epidemic was the postponement of significant injury presentations, especially in the older population [22-25]. For example, patients with hip fractures frequently put off getting treatment because they were worried about getting COVID-19 in a hospital. The significance of prompt access to orthopedic care was underscored by the higher incidence of complications and mortality that followed these delays. Furthermore, the pandemic had a major financial impact on orthopedic surgeons and health-care facilities due to a sharp decline in elective surgery, which resulted in significant revenue losses [26]. During the pandemic, telemedicine proved invaluable, and several orthopedic departments have integrated telemedicine services into their operations. Moving to virtual consultations reduced the danger of COVID-19 transmission while patient care was maintained [27].

Since the first incidence in India was documented, COVID-19 has spread rapidly there. The authorities took Many steps to stop the virus from spreading, including a countrywide lockdown in March 2020. These actions stopped production in most industries and outdoor pursuits except for canceled trip plans. These events engaged many middle-aged and young adult participants [28].

There has been a decrease in fracture reports, indicating that older people were more susceptible to low-energy falls due to their sedentary lifestyle and decreased activity during the pandemic [29]. Multicenter research found that older individuals had an increase in fracture cases. The majority of patients with low-energy injuries were found to be older. Reduction in fracture cases in contrast to the identical timetable in 2019, another element in 2020 merited consideration. However, health-care professionals should pay attention to this development [30].

CONCLUSIONS

In medical systems throughout the globe, COVID-19 has essentially impacted every facet of orthopaedic trauma clinical practice. Comparing 2020 to 2019 revealed a sharp drop in hospitalizations, outpatient care, and elective surgery. However, when COVID-19 patient cases rose, the pandemic's severity became even more severe. To ascertain the effect of COVID-19 on epidemiology and orthopedics, this study may offer a new avenue for investigation. This study, which compiled the effect of COVID-19 on the epidemiology of orthopedic cases across several nations, is entirely unrelated. The research may aid in the researchers' rational conclusion-making and assist health-care professionals in allocating workforce and resources during this epidemic.

CONTRIBUTION OF AUTHORS

Research concept- Amaresh Prasad Mohapatra
Research design- Amaresh Prasad Mohapatra, Gopal Krishna Hembram
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