

Comparing pattern of musculoskeletal injuries prior to and during COVID-19 lockdown: A time-trend case study from a tertiary level Trauma Center of Northern India

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ABSTRACT

Background and Aims: In the COVID-19 times, Indian sub-continent is struggling to contain the epidemic and trying to strengthen the existing health infrastructure, the national level lockdown has raised concerns about the pattern of injuries whether it has remained the same or has changed over this period. This is the first study to compare injury pattern during the two months lockdown period with the data of corresponding months from years 2016-2020. Also we compared the age- and sex-wise distribution patterns of these injuries for the above mentioned period. **Methods:** This retrospective cross sectional study was conducted by the Department of Orthopaedics in Guru Gobind Singh Medical College and Hospital (GGSMCH) in Faridkot, Punjab. Secondary data for patient's age and sex, mode of injury, and site of injury was collected through record review for the period of two months (24th March to 24th May) for five consecutive years of 2016-2020. Descriptive analysis and Chi-square test was used to see the association between age and sex with mode and type of injury. **Results:** The five year injury trends reflected that the proportion of injuries in 2016 was 16.5% ($n = 48$) of the total musculoskeletal injuries ($n = 291$) which rose to 23.4% ($n = 68$) in 2020. Majority of the patients were males (80%), and belonged to adult age group (69.4%) followed by elderly (17.2%), adolescents (8.6%) and children (4.8%). The proportion of road traffic accidents out of all injuries significantly reduced during the lock down period of two months in 2020 ($p = 0.001$). On the contrary, the proportion of injuries due to falls as well as unspecified assault increased significantly in 2020 as compared to previous years. **Conclusions:** The proportion of musculoskeletal injuries have increased from 2016-2020. Unspecified assault and all types of falls pushed the road traffic accidents to third position during the lockdown period in 2020 as compared to previous four years. Injury surveillance needs to be integrated in routine hospital system for precise information and for more efficient functioning.

Keywords: Assault, COVID-19, falls, India, injury surveillance, lockdown, musculoskeletal injuries, road traffic accidents

Introduction

Musculoskeletal injuries are among the top ten causes of mortality and morbidity globally.^[1] These include intentional and unintentional injuries. Among unintentional injuries, road traffic accidents (RTAs), falls from various levels, poisoning etc., share the major proportion. Assault and self-harm are the two major

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How to cite this article: Dahuja A, Bansal K, Gupta N, Arora S, Garg RS, Gupta M. Comparing pattern of musculoskeletal injuries prior to and during COVID-19 lockdown: A time-trend case study from a tertiary level Trauma Center of Northern India. J Family Med Prim Care 2021;10:427-31.

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Received: 05-08-2020

Revised: 29-09-2020

Accepted: 24-11-2020

Published: 30-01-2021

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_1595_20

reasons of intentional injuries. According to Global Burden of Disease Report 2017, the prevalence of RTA among males and females was found to be 13.7 million and 9.7 million respectively per year. Similarly in a developing country like India, the major causes of injuries were found to be road traffic accidents, falls from various levels, assault and self-harm.^[2-4]

It is well documented in the literature that these causes of injuries constitute preventable causes of death. Thereby, morbidity and mortality due to these causes can be effectively reduced by taking appropriate public health actions. Thus, making the musculoskeletal injuries, a matter of public health concern due its high incidence, and high economic and societal burden posed by increasing both direct and indirect costs.^[5] Hence, it becomes important to determine the pattern of these injuries and, to look into the age- and sex distribution so as to take effective remedial measures.

In the COVID-19 times, when Indian sub-continent along with the whole World was struggling to contain the pandemic, and trying to strengthen the existing health infrastructure, the national level lockdown raised concerns about the pattern of injuries whether it has remained the same or changed over this period. In India, national level lockdown or curfew was observed from 24th March to 24th May 2020. In view of this, it could be anticipated a fall in road traffic accidents and overall musculoskeletal injuries but this needs to be backed up with evidence based data. Orthopaedic injuries don't take a vacation just because we are quarantined at home.

It becomes imperative to look into pattern of injuries during this time period both from clinical as well as public health point of view. Only evidence based real time data can guide policy decisions for improving health infrastructure (in terms of manpower, hospitals, and finance) so that the community needs can be addressed sufficiently and timely. For instance, it was waved in the news that the cases of domestic violence (intentional injuries) have increased drastically during this lockdown period.^[6] But again the facts and figures need to be re-looked and verified in the light of real data.

To our best of knowledge, this is the first study to compare injury pattern during the two months lockdown period with the data of corresponding months from years 2016-2020 (Temporal trend). Also we compared the age- and sexwise distribution patterns of these injuries for the above mentioned period.

Methodology

This retrospective cross sectional study was conducted by the Department of Orthopaedics in Guru Gobind Singh Medical College and Hospital (GGSMCH), a tertiary care centre situated in Faridkot, Punjab. The study population comprised of the patients presenting with musculoskeletal injuries to the Trauma Unit of Emergency Department and admitted under the Department of Orthopedics.

Secondary data was collected through record review using a data extraction sheet for the period of two months (24th March to 24th May) for five consecutive years of 2016-2020. Data was extracted for patient's age and sex, mode of injury, and site of injury from the case records. Ethical approval for this study was taken from Institute's Ethics Committee. The collected data was kept confidential, and was used only for research purpose. Ethical approval was obtained approval from the ethics committee on 21/07/2020.

Data was entered and analysed by using SPSS v22.0 software. Descriptive analysis was done to express age, sex, mode and type of injury in terms of numbers and %ages. Chi-square test was used to see the association between age and sex with mode and type of injury. Temporal trend analysis was used compare the injury pattern for five consecutive years for the months of 24th March to 24th May. P- value less than 0.05 was taken for statistical significance.

Results

This hospital based study was carried out to explore the pattern of injury over a period of two months for the past five years, corresponding the COVID-19 lockdown time frame in 2020. It was found that the proportion of trauma and injury patients had increased from 16.5% to 23.4% in 2020 since 2016. Majority of the patients were males (80%), and belonged to adult age group (69.4%) followed by elderly (17.2%), adolescents (8.6%) and children (4.8%). Unspecified transport injuries were the most common reason for trauma followed by unspecified assault, Unspecified fall on the same level or from less than 1 meter and Unspecified fall from a height of one metre or more. Lower limbs and upper limbs were the most commonly injured sites, contributing upto 85%. [Table 1]

It can be interpreted that the proportion of road traffic accidents out of all injuries significantly reduced during the lock down period of two months in 2020 ($p = 0.001$). On the contrary, the proportion of injuries due to falls as well as unspecified assault increased significantly in 2020 as compared to previous years during the same time frame of two months of lockdown. [Table 2 and Figure 1]. However, we could not find any significant difference in the age, gender-wise and site-wise distribution of injuries over the period of five years. [Table 2, Figures 2 and 3]

Discussion

It was an observational hospital based study conducted in a Government Medical College at Faridkot, using retrospective data from 2016-2020 over a period of two months from 24th March to 24th May. The aim of the study was to compare the trends and pattern of injuries for the last five years over a period of two months, corresponding to lockdown period due to COVID-19 epidemic in India.

Table 1: Characteristics of injury patients from 24th March to 24th May over a period of five years (2016-2020)

Patient Characteristics		Frequency (n=291)	Percent
Year	2016	48	16.5
	2017	58	19.9
	2018	47	16.2
	2019	70	24.1
	2020	68	23.4
Age categories	Child (0-12 years)	14	4.8
	Adolescence (13-18 years)	25	8.6
	Adults (19-59 years)	202	69.4
	Elderly (60 or more than 60)	50	17.2
Gender	Male	234	80.4
	Female	57	19.6
*Type of Injury (ICD-11 Coding)	Unspecified transport injuries (PG4Z)	165	56.7
	Unspecified assault (QE8Z)	60	20.6
	Unspecified fall on the same level or from <1 meter (PA60)	37	12.7
	Unspecified fall from a height of 1 metre or more (PA61)	29	10
Site of injury	Lower limb	174	59.8
	Upper limb	76	26.1
	Knee	23	7.9
	Spine	18	6.2

Table 2: Comparing patient characteristics and injury type for two months over a period of 5 years (2016-2020)

Patient Characteristics	Attributes	Year					Total (n=291)	Chi-square P
		2016 (n=48)	2017 (n=58)	2018 (n=47)	2019 (n=70)	2020 (n=68)		
Age categories	Child (0-12 years)	1	4	1	4	4	14	0.44
	Adolescence (13-18 years)	4	2	6	8	5	25	
	Adults (19-59 years)	38	37	34	48	45	202	
	Elderly (60 or more than 60)	5	15	6	10	14	50	
Gender	Female	9	11	7	14	16	57	0.85
	Male	39	47	40	56	52	234	
Type of Injury (ICD 11 Coding)	Unspecified transport injuries (PG4Z)	35	36	31	43	20	165	0.001*
	Unspecified assault (QE8Z)	7	8	7	15	23	60	
	Unspecified fall on the same level or from <1 M (PA60)	5	12	6	4	10	37	
Site of Injury	Unspecified fall from a height of 1 metre or more (PA61)	1	2	3	8	15	29	0.65
	Lower limb	30	33	27	42	42	174	
	Upper limb	9	14	13	20	20	76	
	Knee	7	7	4	3	2	23	
	Spine	2	4	3	5	4	18	

*Significant P<0.05

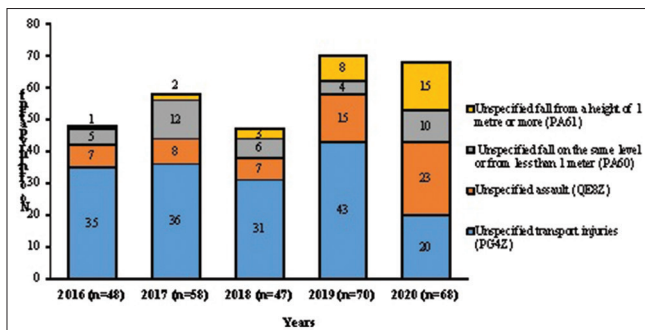


Figure 1: Trend of mode of injury from the period of 24th March to 24th May over a period of five years (2016-2020)

It was observed that the total number of cases of trauma and injury had increased from 2016 to 2020 as reflected in Table 1,

irrespective of COVID-19 influence. This finding is well supported by Mohan et al. who documented that deaths due to road traffic accidents have increased by about 8% annually after 2000.^[7]

Males that too, in the adult age group were predominantly injured and this finding is in concurrence with previous studies in different settings. This may be due to the fact that adult males are more involved in outdoor, and other high risk activities.^[8]

About 56.7% patients admitted to the emergency department sustained road traffic injuries over a period of five years. The second commonest mode of injury in our study was all type of falls (22.7%) followed by unspecified assault (20.6%). [Table 1] Globally, road traffic injuries along with falls constitute the top leading causes of injuries. Road traffic

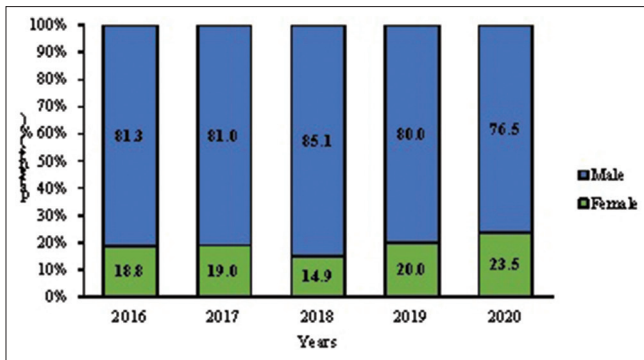


Figure 2: Sexwise distribution of patients over a period of five years (2016-2020)

injuries were mostly young adult males similar to most other studies.^[9-13]

The five year injury trends reflected that the proportion of injuries in 2016 was 16.5% of the total injuries (n = 291) which rose to 23.4% in 2020. [Figure 1]. It was found that the road traffic injuries were the most common type of musculoskeletal injuries from 2016-2019. However, due to national level lockdown in 2020, the proportion of unspecified assault and all type of falls increased significantly, and RTAs took the third place [Figure 1 and Table 2]. This could be attributed to the fact that due to lockdown, people resided inside the houses and the incidence of RTAs fell significantly. But due to non- availability of precise information on the type of assault and falls, we could not find the reason for increased incidence of these injuries. Albeit, the news during COVID-19 lockdown period reported increased incidences of domestic violence within the families could be a possible explanation for this important finding.^[6]

There were many aspects like time of injury, intent and nature of injury, detailed information about mode of injury like vehicles impacted during the accident, type of assault, nature of fall, types of injuries surfaced by the patient etc., on which information was not available in the records. This severely impacts the utilization of data for decision making and effective remedial actions.^[14,15] We are presenting this as an exploratory study, to share our experiences of data collection, study strengths and limitations. Though this study could shed light on the broad categories of injuries, but the study has limitations owing to data availability.

As known well, injury surveillance is very weak in India, with lack of uniformity of data collection guidelines.^[16] It is clear from the data that on an average, only 1-2 injury patients per day were being admitted to emergency department of this medical college, which indicated a low patient load of trauma and injury cases. In such a scenario, we can possibly train the emergency medical officers and staff nurses to fill a standard format issued by World Health Organization to capture detailed injury information.^[17] The data entry operator under Integrated Disease Surveillance Program at the district level could then enter this data which will hardly consume less than 30 minutes in a week. The district epidemiologist at the district level could be resourceful in

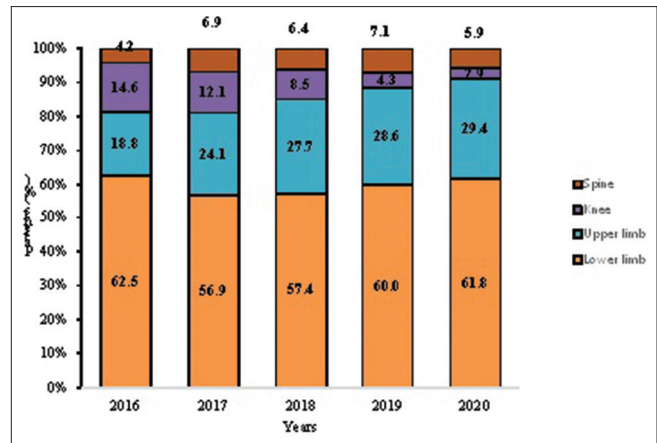


Figure 3: Trend of site of injury from the period of 24th March to 24th May over a period of five years (2016-2020)

co-ordinating this system among medical college or district level hospital. Thus, with the existing resources, we can establish a sustainable injury surveillance system at the district hospital level which can be instrumental in providing state and national level estimates of injury burden for policy level decisions and public health action. *This model can then be extended at the grassroot level, both in rural and urban areas. In the rural areas, primary care physicians are available at Primary Health Centre (PHC) who can further train ANMs and ASHA workers working at the sub-centre and village levels to probe and record the detailed history of an injury incident. Similarly, the USHA workers available at dispensary in supervision with the Medical Officer can be resourceful in strengthening injury surveillance in India.*

For instance, if we know that majority of the road traffic accident victims are two-wheeler occupants driving without helmet or driving under the impact of alcohol, then this information can guide us to draft and enforce strict laws for wearing helmets and, strict action against drinking while driving. Thus helping to formulate tailor made public health solutions guided by real time data.

Apart from successful examples of *injury surveillance systems implemented in developed countries like Weapon Related Injury Surveillance System in United States of America, Australian National Injury Surveillance and Prevention Program and the Canadian Hospital Injury Reporting and Prevention Program*; resource- constraint countries like Sub-Saharan Africa has showed that injury surveillance was an effective measure to track type of care provided to patients.^[18-20]

Through this study, it is clear that injury surveillance system is not functional in India. And even raw data has the capacity to shed light on major injury trends. Hence, it becomes the need of the hour to strengthen the injury surveillance system by incorporating it into routine hospital work.

Conclusions

The proportion of musculoskeletal injuries have increased from 2016-2020. Unspecified assault and all types of falls pushed the

road traffic accidents to third position during the lockdown period in 2020 as compared to previous four years. All these facts can help the orthopaedics team to manage different sets of injury patterns in a more effective way during a pandemic or lockdown period along with an additional training curriculum in orthopaedic residency and preventive guidelines can be prepared to keep population safe at home as well as outside.

What is already known on this subject

1. *Injuries constitute among the top ten causes of morbidity and mortality throughout World including India.*
2. *Among injuries, road traffic accidents comprise of the major portion, followed by different types of assaults and falls.*
3. *Injury surveillance is very weak in India, leading to underestimation of burden of morbidity and mortality.*

What this study adds to knowledge

1. *During lockdown period in 2020, unspecific assaults and falls increased significantly to occupy first and second position out of the total injuries reported at the tertiary care hospital, instead of general pattern where road traffic accidents were the major contributor of injuries.*
2. *Details of injuries like its intent, time, mode, type etc., could not be retrieved due to data quality issues. This severely limits the data use for taking corrective and preventive actions for reducing the incidence of such injuries.*
3. *Training and supportive supervision for filling WHO injury proforma by community health workers at primary and secondary level health facilities, and those of nursing staff at tertiary level hospitals by the Primary Health Care Physicians or Medical Officers can strengthen injury surveillance in India.*

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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