

**Original Article****Effect of COVID-19 Pandemic and National Lockdown on the Medicolegal Aspects of Trauma in Sohag Governorate: a Comparative Retrospective Study****Reda M. Elsayed and Sara E. Kasem***Department of Forensic Medicine and Clinical Toxicology, Faculty of Medicine, Sohag University***ABSTRACT****\*Corresponding author:**

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Corona virus (COVID-19) infection, which was first reported in China in 2019, has rapidly spread across the entire world. On 24 March 2020, the Egyptian government started a national lockdown trying to decrease the spread of infection. **The aim of the work:** To study the medicolegal aspects of trauma cases attended Sohag University Hospitals during the COVID-19 pandemic and national lockdown in comparison with those in the same period in the preceding year 2019. **Subjects and methods:** The study is a retrospective study included trauma cases attended to Sohag University Hospitals from 1/4/ 2020 to 30/5/ 2020 (COVID group) and those from 1/4/ 2019 to 30/5/ 2019 (Pre-COVID group). **Results:** The total number of cases was 424 in COVID group and 427 in Pre-COVID group. The majority of trauma was in the age groups (<18 years and 18-40 years) representing (82.8%) in COVID group and (89.8%) in Pre-COVID group. Male/female ratio was 3:1 in the COVID group 4:1 in Pre-COVID group. For the cause of injury, there was a significant difference between both groups. Accidental mode was the main mode of injury. In respect to site and pattern of injury, head and neck injuries was the main site and fractures were the most common type of injury in both groups. Concerning the outcome, the majority of cases were improved. **Conclusion:** COVID-19 has disrupted social structures worldwide. These disruptions directly and indirectly affected trauma admissions at Sohag University Hospitals. In spite of the total number of trauma cases did not change but there was a change in the causes of injury and outcome of the case in COVID group in comparison with Pre-COVID group.

**Key words:** COVID – 19 pandemic, Egyptian lockdown, Trauma pattern and outcome.

## I. INTRODUCTION

The novel Corona virus (COVID-19) infection, which was first reported in China in December 2019, has rapidly spread across the entire world (Maryada et al., 2020). In response to World Health Organization report on 11th March 2020, worldwide governments decided to 'lockdowns', making severe restrictions on the free movement of people in trying to prevent the virus' spread (WHO,2020 and Hampton et al., 2020). Many different strategies have been proposed and implemented worldwide in an attempt to contain this pandemic, some more successful than others (Jorge et al., 2020). Injuries represent a major preventable and growing public health worldwide problem (Murray and Lopez, 1997).

So, the current study aimed to study the variation in the medicolegal aspects of different trauma cases attended Sohag University Hospitals during the COVID-19 pandemic and national lockdown imposed by the government on 24 March 2020 and their outcome in comparison with those in the same period in the preceding year 2019.

## II. SUBJECTS AND METHODS

The current study is a retrospective descriptive hospital based study depends on analysis of data collected from the records of Emergency Unit and Surgery (general and special) Departments, Sohag University Hospitals (a tertiary care hospital). The study included two groups:

**COVID group:** included trauma cases attended to Sohag University Hospitals from 1<sup>st</sup> April 2020 to 30<sup>th</sup> May 2020 (the period of national lock down)

**Pre-COVID group:** included trauma cases attended to Sohag University Hospitals from 1<sup>st</sup> April 2019 to 30<sup>th</sup> May 2019 (the same period on the preceding year without lockdown).

**For both groups the following data was collected:**

- Socio-demographic data of cases: age, gender and residence.
- Medico-legal aspects of cases: cause, pattern, site, type and outcome of injuries. Causative instruments, types of treatment (surgical or conservative) provided, and condition of the case at discharge time.

### Statistical analysis:

All collected data were revised and analyzed by SPSS program and calculated as numbers and percentages. P value < 0.05 considered significant. Chi-Square test was used for comparison between the study groups then the results presented in the form of tables and figures.

### Ethics considerations:

Ethical approval was obtained from the Medical Research Ethics Committee of Faculty of Medicine - Sohag University, according to the commitment standard operating procedure guidelines on 10/2/2021 under **IRB** Registration number: **Soh-Med-21-02-29**. Consent to participate from participants is not applicable as this study is a retrospective one and the data was obtained from database of Sohag University Hospitals.

### III.RESULTS

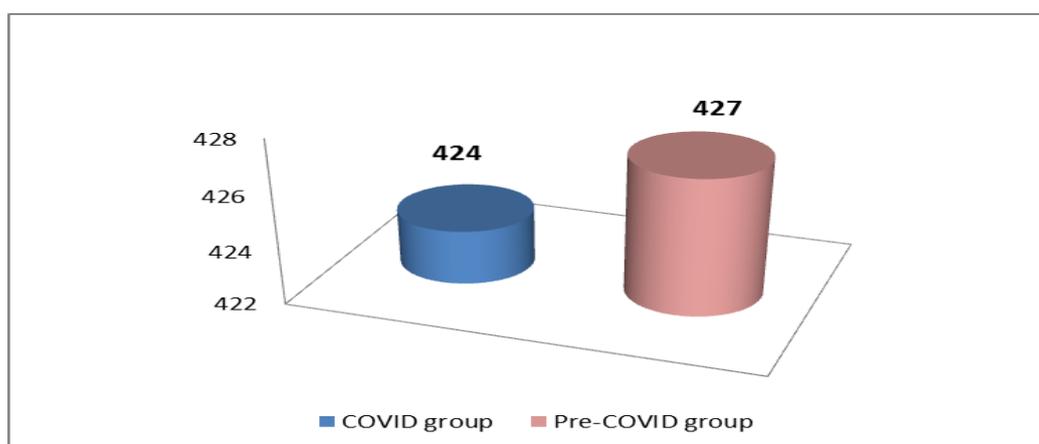
The present study included two groups: 424 patients attended to the hospitals during the period from April 2020 to May 2020 (COVID group) which is the period of governmental lockdown and 427 patients presented to the hospitals during the period from April 2019 to May 2019 (Pre-COVID group) of both sexes as shown in (Figure 1).

In the present study, irrespective of the group analyzed, the majority of trauma was in the age groups (<18 years) and age group (18-40 years) where they represented

(82.8%) in COVID group and (79.8%) in Pre-COVID group as shown in (Table 1).

There was a significant statistical difference between both groups in gender percentages (p-value: 0.04) where males represented 76.7% and females were 23.3% in COVID group with the male/female ratio 3:1 while males represented 82.2% and females were 17.8% in Pre-COVID group with the male/female ratio 4:1 as shown in (Table 1).

For residence of the cases, (67.3%) of the COVID group were from rural area and (32.7%) from urban area while (72.1%) of the Pre-COVID group were from rural area and (27.9%) from urban area as shown in (Table 1).



**Figure (1):** Total number of cases of the studied groups admitted to Sohag University Hospitals during the periods of the study

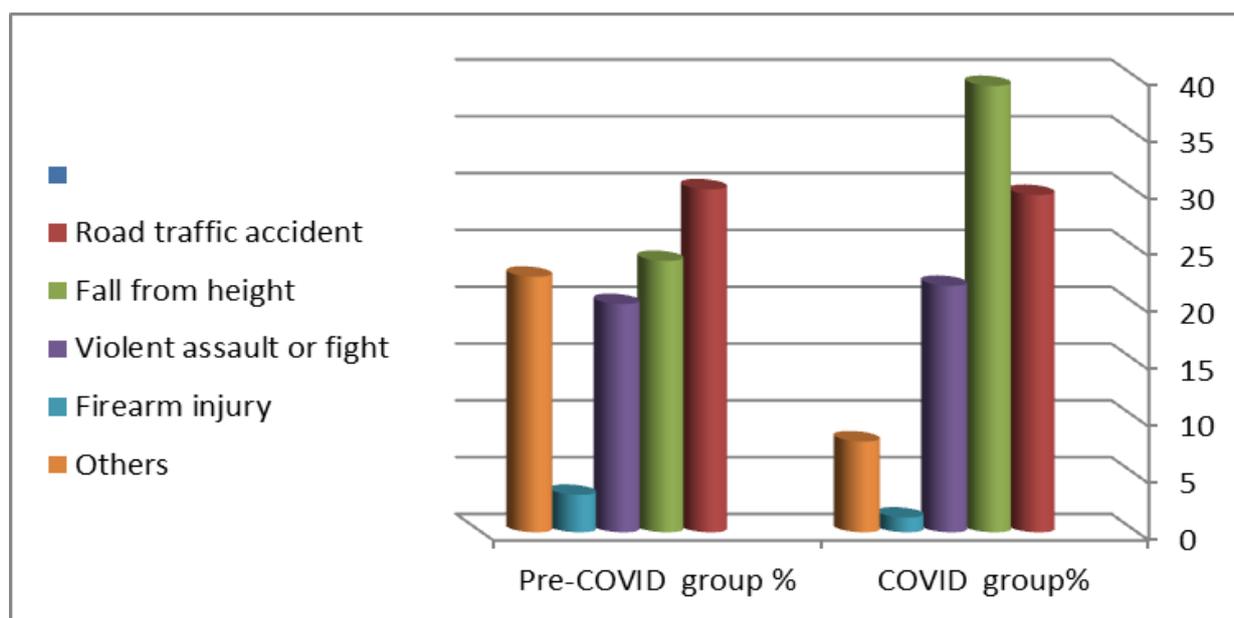
According to the cause of injury, there was a highly significant statistical difference between both groups (p-value: 0.0001). The most common cause of injury in COVID group was falls from height (39.3%) followed by road traffic accidents (29.7 %), assault from others (21.7 %), firearm (1.3%) and other causes (as animal bite and struck by object) (8 %). In the Pre-COVID group, the most frequent causes of trauma were road

traffic accidents (30.2 %), falls (23.9 %), assault from others (20.1 %), firearm (3.3%) and others (22.5 %) as shown in (Figure 2).

No significant statistical difference was noted in the mode of trauma as most of them were accidental in both COVID and Pre-COVID groups (76.8% and 76.3% respectively) followed by homicidal (23.2% and 23.7% respectively) and there was no suicidal cases in both groups as shown in (Figure 3).

**Table (1):** Demographic data (age, gender and residence) of the studied groups admitted to Sohag University Hospitals during the periods of the study by using Chi-Square test

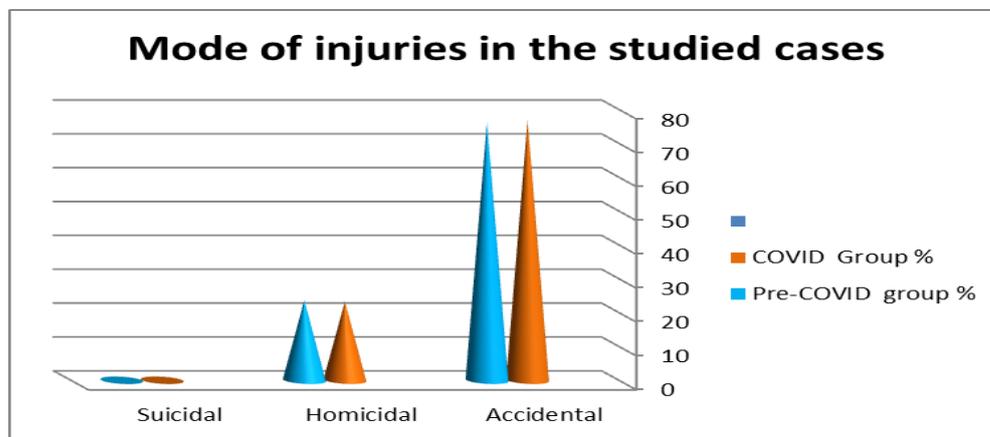
Age groups (years)	COVID Group		Pre-COVID group		P value
	Number	Percentage (%)	Number	Percentage (%)	
<18 years	196	46.2	174	40.7	0.56
18-40years	155	36.6	167	39.1	
40-60 years	59	13.9	62	14.5	
> 60 years	14	3.3	24	5.7	
Total	424	100	427	100	
Sex	Number	Percentage (%)	Number	Percentage (%)	P value
Male	325	76.7	351	82.2	0.045
Female	99	23.3	76	17.8	
Total	424	100	427	100	
Residence	Number	Percentage (%)	Number	Percentage (%)	P value
Urban	139	32.7	119	27.9	0.119
Rural	285	67.3	308	72.1	
Total	424	100	427	100	



**Figure (2):** Causes of injury among the studied groups admitted to Sohag University Hospitals during the periods of the study

As regards the causative instruments, no significant statistical difference was found between COVID and Pre-COVID groups. The majority of cases injured by blunt instruments followed by sharp ones and finally firearm

weapons (83.2%, 15.5% and 1.3% respectively) for COVID group, and (78.5%, 18.2% and 3.3% respectively) for Pre-COVID group as outlined in (Table 2).



**Figure (3):** modes of injuries among the studied groups admitted to Sohag University Hospitals during the periods of the study

**Table (2):** Causative instruments used among the studied groups admitted to Sohag University Hospitals during the periods of the study by using Chi-Square test

Causative instrument	COVID Group		Pre-COVID group		P value
	Number	Percentage (%)	Number	Percentage (%)	
Blunt instrument	353	83.2	335	78.5	0.057
Sharp instrument	66	15.5	78	18.2	
Firearm weapon	5	1.3	14	3.3	
Total	424	100%	427	100%	

In respect to site, in COVID group the main site of trauma was head and neck injuries followed by lower limbs, upper limbs, chest, abdomen and pelvis and lastly polytraumatized cases with percent (33.6%, 23.8%, 20.7%, 15.1% and 6.6% respectively). While in Pre-COVID group the main site was head and neck injuries followed by upper limbs, lower limbs, chest, abdomen and pelvis and lastly polytraumatized cases with percent (25.8%, 25.5%, 23.3%, 17.5% and 7.9% respectively) as outlined in (Table 3).

For pattern, fractures were the most common type of injury at different sites in both groups where it represented (18%,

17.9%, 11.4% and 4.4%) in lower limb, skull, upper limb and fracture ribs respectively in COVID group. While in Pre-COVID group the percent of fractures were (17.5%, 14.5%, 13.2% and 5.2%) in lower limb, skull, upper limb and fracture ribs respectively as shown in (Table 3).

According to legal classification of wounds, the percentage of wounds (simple, dangerous and fatal wounds) in COVID group were (20.6%, 77.2% and 2.2% respectively). While in Pre-COVID group it was (21.2%, 76.2% and 2.6% respectively) as shown in (Table 4).

**Table (3):** Types of injury and their sites among the studied groups admitted to Sohag University Hospitals during the periods of the study by using Chi-Square test

Type of injury	COVID Group		Pre-COVID group		P value
	Number	Percent%	Number	Percent%	
<b>Head and neck</b>					
External wound	9	2.2	5	1.1	0.026
Fractures	76	17.9	62	14.5	
Intracranial hemorrhage	15	3.5	23	5.3	
Postconcussion	27	6.3	18	4.2	
Mixed injuries	16	3.7	3	0.7	
<b>Total</b>	<b>143</b>	<b>33.6</b>	<b>111</b>	<b>25.8</b>	
<b>Upper limb</b>					
External wound	22	5.3	30	7	0.75
Fractures	48	11.4	56	13.2	
Amputation	9	2.2	15	3.5	
Mixed injuries	9	2.2	8	1.8	
<b>Total</b>	<b>88</b>	<b>20.7</b>	<b>109</b>	<b>25.5</b>	
<b>Lower limb</b>					
External wound	11	2.5	18	4.2	0.117
Fractures	76	18	75	17.5	
Amputation	2	0.5	3	0.7	
Mixed injuries	12	2.8	4	0.9	
<b>Total</b>	<b>101</b>	<b>23.8</b>	<b>100</b>	<b>23.3</b>	
<b>Chest, abdomen and pelvis</b>					
External wound	17	4	14	3.2	0.481
Fractures	19	4.4	22	5.2	
Internal hemorrhage	12	2.8	12	2.8	
Mixed injuries	16	3.7	27	6.3	
<b>Total</b>	<b>64</b>	<b>15.1</b>	<b>75</b>	<b>17.5</b>	
<b>Poly traumatized</b>					
	<b>28</b>	<b>6.6</b>	<b>32</b>	<b>7.9</b>	---
<b>Total</b>	424	100	427	100	

(Table 5) outlined the treatment provided to the patients, after exclusion of escaped and dead cases, the total number of cases was 370 cases in COVID group and in Pre-COVID group it was 369 cases. Statistically, no significant difference was found between COVID and Pre-COVID groups. The majority of cases undergo surgical intervention in both groups (78.7 % of COVID group and 76.5 % of Pre-COVID group), the remaining cases undergo

conservative treatment (21.3% of COVID group and 23.5% of Pre-COVID group).

Concerning the outcome of the studied patients at the time of discharge, a significant difference was detected between COVID and Pre-COVID groups as p value was (0.003). In the COVID group, the majority of cases were improved (74.3%), other outcome frequencies (disfigurement, permanent infirmity, death and escaped before intervention) were as follow (2.5%, 10.6%, 1.8% and 10.8% respectively). While in the

Pre-COVID group, the outcome frequencies (improvement, disfigurement, permanent infirmity, death and escaped before

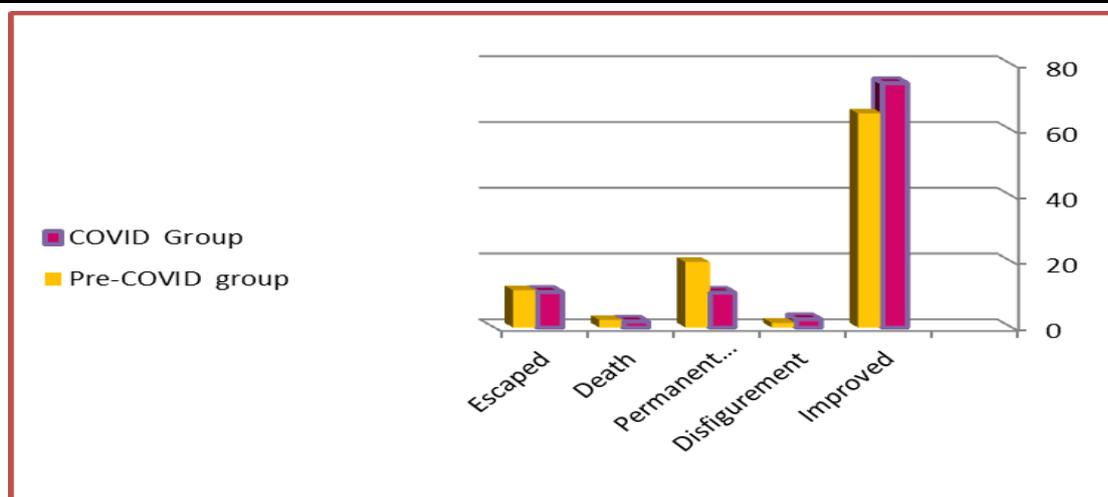
intervention) were as follow (65.1%, 1.4%, 19.9%, 2.3% and 11.3% respectively) as shown in (Figure 4).

**Table (4):** Distribution of the studied groups admitted to Sohag University Hospitals during the periods of the study according to the Egyptian legal classification of wounds using Chi-Square test

Type of wounds	COVID Group		Pre-COVID group		P value
	Number	Percentage (%)	Number	Percentage (%)	
Simple wounds	78	20.6	80	21.2	0.87
Dangerous wounds	292	77.2	289	76.2	
Fatal wound	8	2.2	10	2.6	
Total admitted cases	378	100%	379	100%	

**Table (5):** Types of treatment provided to the studied groups admitted to Sohag University Hospitals during the periods of the study by using Chi-Square test

Type of treatment	COVID Group		Pre-COVID group		P value
	Number	Percentage (%)	Number	Percentage (%)	
Conservative treatment	79	21.3	87	23.5	0.46
Surgical treatment	291	78.7	282	76.5	
Total admitted survived cases	370	100%	369	100%	



**Figure (4):** The outcome of the studied groups admitted to Sohag University Hospitals during the periods of the study at the time of discharge

#### IV. DISCUSSION

The present study is a descriptive hospital-based study which was conducted to study for variation in the medico-legal aspects of different trauma cases attended Sohag University Hospitals during the COVID-19 pandemic and lockdown imposed by the government on 24 March 2020 and their outcome in comparison with those in the same period in the preceding year 2019.

The total number of cases in COVID group (period of lock down) was 424 and in Pre-COVID group (the same period in the preceding year) was 427. Statistically no significant difference was found between both groups. Sohag Governorate is a remote Governorate and most of their population activities and businesses take place during daylight hours. Therefore, the incidence of injuries also increases during the day. So, this partial lockdown has not affected the incidence of trauma but it could modify the mechanism and types of injuries.

On the contrary to the present results, *Fahy et al. (2020)*, observed a significant reduction in trauma rates in Ireland during the lockdown period. 136 patients presented to ED with radiologically proven skeletal trauma during the study period in comparison with 174 patients during the same period in 2019. Another study by *Yeung et al. (2021)*, on presentation of oral and maxillofacial trauma to a central London hospital, found a dramatic decrease in overall numbers of refereed cases to the hospital, but an increase in proportion of trauma cases during the lockdown period in 2020. A total of 111 cases referred in 2020, 63.1% of these were trauma related, compared with total 380 cases in 2019 with only 50.5% of them were trauma related. This may be due to considerable variations between developing and developed countries.

In the present study, the majority of trauma cases in both groups were in the age groups <18 years and 18-40 years. It was suggested that this is the age of childhood and adulthood where persons frequently carelessly practice dangerous exercises and drive motor vehicles thus exposing themselves to all types of violent trauma (Thorén et al., 2010).

On harmony with the present results, is the study of Park et al. (2020), on orthopedic trauma workload in London during pre-covid and post-covid periods who found that the most of cases presented in age group (18-39 years) in both periods.

In regard to gender, males outnumber females in both groups with the male/female ratio 3:1 in COVID group and the male/female ratio in Pre-COVID group 4:1. Other studies in the developed countries stated comparable results as the male/female ratio ranged from 2:1 to 4:1 (Gassner et al., 2003). In spite of a considerable variations between developing and developed countries may be present but still male outnumber female by more than 2 to 1 times. Men usually outnumber women in developing countries due to their mobility, more frequently involved in stronger physical, violent activities, and road traffic accidents and often sustain more severe injuries compared with females (El Shehaby et al., 2020).

The most common cause of injury in COVID group was fall from height followed by road traffic accidents, assault from others, firearm and other causes. In Pre-COVID group, which represented the period of normal life style before lockdown the most frequent causes of trauma were road traffic accidents, followed by falls from height, assault from others, firearm and others. The decrease in the number of RTA cases during the

lockdown period can be explained by enforced ban on movement, closure of highways, and strict implementation of traffic rules. So, most of citizen stay at homes and exposed more to domestic trauma as falls from height than road traffic accidents. Despite lockdown, there were road traffic accidents with a reasonable percent, probably from the movement of essential services and from those violating the lockdown (Maryada et al., 2020). Several studies reported that traffic accidents were the most prevalent etiology of facial trauma as the study of El Shehaby et al. (2020), on Assiut Governorate where the road traffic accidents were the main etiology of injury (69.7%), followed by falls (15.1%) and violent assaults and fight (10.2%) while firearm injuries were the least etiology (5%).

In the present study, most of cases were accidental in both groups followed by homicidal and there was no suicidal. This can be explained by the fact that road traffic accidents and falls which were the main causes of injuries for both groups occur mainly in an accidental manner. This is in harmony with other studies, El Shehaby et al. (2020), where accidental manner of injury was the most common manner (83.1%) followed by the homicidal manner (16.3%), only seven cases were due to suicidal attack.

As regards the causative instruments, blunt instruments were responsible for the majority of cases in both groups, which agree with those of Gilyoma and Chalya (2013), which is one of the most common forms encountered in a variety of scenarios such as transportation injuries, falling from height, violent assaults and being struck by firm objects (Kranioti, 2015).

Concerning site, the main site of trauma in both groups was head and neck

injuries followed by lower limbs, upper limbs, chest, abdomen and pelvis and lastly polytraumatized cases.

Park et al. (2020), in their study on orthopedic trauma workload in London during pre-COVID and COVID periods found that the main site of injury in pre-COVID was lower limbs followed by upper limbs, pelvis and lastly polytrauma (54, 49, 22 and 18 cases respectively). While in COVID period both upper and lower limbs have the same number of cases (22 cases), followed by pelvis (19 cases) and lastly polytrauma (17 cases).

According to the Egyptian legal classification of wounds that depends on the expected period of recovery (more or less than 20 days and if accompanied by infirmities); the majority of the studied cases results were dangerous wounds in both groups. It was expected as the most common pattern of injuries was fractures which are basically dangerous wounds.

As regards the treatment provided to the patients, after exclusion of escaped and dead cases. Statistically, no significant difference was noted between COVID and Pre-COVID groups. The majority of cases undergo surgical intervention in both groups. In a direct reflection of the fact that the number of major traumas were unchanged, the number of patients who required critical in-hospital interventions and operations was also unchanged. This has significant implications for workforce planning during future pandemic or disaster situations and highlights the importance of maintaining adequately resourced trauma services (Jacob et al., 2020).

Concerning the outcome of the studied patients, at the time of discharge the majority of cases in both groups were improved

followed by permanent infirmity, escaped before intervention, disfigurement and lastly death. This results are comparable to the results of El Shehaby et al. (2018), in their study on the pattern and the trend of hospitalized injuries in Upper Egypt during the period 2010 -2016 where improvement was the main outcome of their cases followed by death, escaped before intervention and discharge on demand with percent (77%, 16%, 6% and 1% respectively). As regards mortality rates no significant difference in mortality rate were reported between both groups. Similar to this results is study of Rajput et al. (2020), in the North West of England center of trauma during the COVID-19, who stated that no significant differences were found in mortality rates between pre-lockdown and lockdown periods (11.0% and 9.9% respectively).

## V. CONCLUSION

COVID-19 has disrupted social structures worldwide. These disruptions can be directly seen in relation with trauma admissions at Sohag University Hospitals. In spite of the total number of trauma cases did not change during lockdown period but there was change in the causes of injury and outcome of the case at the time of discharge in comparison with that recorded in the same period in the preceding year.

## IV. RECOMMENDATIONS

- It would be important to conduct further studies across multiple institutions within a community in various regions to further characterize the impact of COVID-19.

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## الملخص العربي

مدي تاثير وباء كورونا وحظر التجوال علي النواحي الطبية الشرعية للاصابات في محافظة سوهاج: دراسة مقارنة مرجعية

رضا محمد السيد ، سارة السيد قاسم

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**المقدمة:** انتشرت عدوى فيروس كورونا المستجد (كوفيد-19) ، التي تم الإبلاغ عنها لأول مرة في الصين في ديسمبر ٢٠١٩ ، بسرعة في جميع أنحاء العالم. وقد تم اقتراح وتنفيذ العديد من الاستراتيجيات المختلفة في جميع أنحاء العالم لاحتواء هذا الوباء. في ٢٤ مارس ٢٠٢٠ ، بدأت الحكومة المصرية فرض حظر التجوال الجزئي في محاولة للحد من انتشار العدوى. **الهدف من البحث:** دراسة الجوانب الطبية الشرعية لحالات الاصابات المختلفة التي تردت علي مستشفيات سوهاج الجامعية خلال جائحة COVID-19 و حظر التجوال الذي فرضته الحكومة مقارنة مع الحالات التي تردت في نفس الفترة في العام السابق ٢٠١٩. **المرضي وطرق البحث:** الدراسة الحالية عبارة عن دراسة مرجعية تضمنت حالات الاصابات التي تم علاجها بمستشفيات سوهاج الجامعية في الفترة من ١ أبريل ٢٠٢٠ إلى ٣٠ مايو ٢٠٢٠ (مجموعة الدراسة وقت جائحة كورونا) وذلك في الفترة من ١ أبريل ٢٠١٩ إلى ٣٠ مايو ٢٠١٩ (المجموعة المقابلة لها في نفس الوقت من العام السابق للجائحة). **النتائج:** بلغ العدد الإجمالي للحالات ٤٢٤ في مجموعة الكورونا و ٤٢٧ في مجموعة ما قبل الكورونا. كانت غالبية الاصابات في الفئات العمرية (أقل من ١٨ سنة و ١٨-٤٠ سنة) التي مثلت (٨٢.٨٪) في مجموعة الكورونا و (٧٩.٨٪) في المجموعة ما قبل الكورونا. هذا وقد كانت نسبة الذكور / الإناث ١/٣ في مجموعة الكورونا و ١/٤ في المجموعة ما قبل الكورونا. وفقاً لسبب الإصابة ، كان هناك فرق ذو دلالة احصائية بين المجموعتين (p-value: ٠.٠٠٠١). وعن طريقة التعرض للإصابة كانت الطريقة الرئيسية للإصابة في كلتا المجموعتين اصابات عرضية. فيما يتعلق بمكان ونوع الإصابة ، كانت إصابات الرأس والرقبة هي المكان الرئيسي للاصابات وكانت الكسور هي أكثر أنواع الإصابات شيوعاً في كلتا المجموعتين. فيما يتعلق بالنتيجة تم تحسن غالبية الحالات في كلتا المجموعتين. **الخلاصة:** لقد عطل فيروس كوفيد-١٩ الحركة الاجتماعية في جميع أنحاء العالم. وتنعكس هذه الاضطرابات بشكل مباشر وغير مباشر بحالات الاصابات في مستشفيات سوهاج الجامعية. وبالرغم من أن العدد الإجمالي لحالات الاصابات لم يتغير خلال فترة الحظر إلا أنه كان هناك تغيير في اسباب الإصابة ونتائج الحالات وقت الخروج مقارنة مع تلك المسجلة في نفس الفترة من العام السابق.