ORIGINAL ARTICLE

Clinical profile and Prevalence of poisoning patients presenting to the emergency department of a teaching hospital in Kerala: A retrospective comparative study before and during COVID-19 pandemic

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Abstract

Background: Emergency physicians must be updated about the variations in poisoning pattern during Covid19 pandemic. Limited data exist on the incidence and characteristics of patients presenting with poisoning in Indian Emergency Departments (ED) during the COVID 19 pandemic. Hence, we aimed to explore the impact of Covid19 pandemic on poisoning cases presenting to the ED.
Methods: This cross-sectional retrospective study was conducted on poisoning patients presenting to ED during the pandemic period (April 1-October 30, 2020 (period 2)), and a matching period before the pandemic (September 1,2019 to March 31, 2020 (period 1)). The rate of prevalence and clinical profile were compared between period 1 and 2 using appropriate statistical test.
Results: A total of 111 (periods 1 = 57, and periods 2 = 54) cases were analysed. Poisoning prevalence rates had slightly increased by 2.7% before the pandemic (51.33%) in comparison to during the pandemic (48.6%) period (p=0.3). Females were predominant in both periods, and the mean age of 32.5 years. The predominant (57%) patient age group was 15-34 years. 36.9% (n=41) patients consumed multiple poisons, 19.8% (n=22) consumed paracetamol, and 14.4% (n=16) patients consumed psychiatric medications. Before lockdown, 27.02% (n=30) patients presented within 3 hours ingestion, and 21.6% (n=24) presented after 3 hours ingestion (p=0.12). A significant delay in arrival of poisoning cases during lockdown (p= 0.12) with increased hospital admission (p=0.03) was observed. A psychiatric disorder was observed in 36.03% cases. Majority of the cases were admitted in the ICU, and 0.9%(n=1) death was recorded.
Conclusions: This is the first Indian study that describes the incidence of poisoning cases and their pattern during the COVID 19pandemic period, study revealed that increased mental health crisis in low resource settings in rural Kerala affects predominantly young population. Study implies the importance of priming the mental health care professionals to initiate their mental health screening programmes.

Keywords: Coronavirus; Poisoning; Pandemics; Mental Health, Emergencies

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INTRODUCTION

Today, toxicology has grown widely to include Occupational Toxicology, Adverse Effects of Drug Overdose, Environmental Toxicology, Medical and Analytical Toxicology, Forensic Toxicology, and Toxicological Research in its domains. In 1992, the American Board of Medical Studies (ABMS) identified the Medical Toxicology as a separate entity.[1] Suicide and self-harm are preventable with timely and low-cost interventions.[2,3] Poisoning is one of the common cause to visit the ED.[4-8] Wide availability, easy access, and extensive use in medical, industrial, household, and agricultural applications increase the risk, exposure, and incidence of poisoning. Mortality and morbidity due to pesticide poisoning in farmers continue to be a significant problem in India. In India, after hanging (45.6%), poisoning (27.9%) is the second most common means of suicide, which increased by 2% from 2014 (26%). The number of fatalities due to poisoning increased by 18.5% in 2015 (28,445 deaths) in comparison to 2014 (23,162 deaths). In India, the fourth fundamental reason for death is poisoning.[10,11,12]

Although the burden of poisoning is acknowledged internationally, a little recent data exist on the incidence and characteristics of patients presenting with poisoning in Indian Emergency Departments. A few studies focus on the epidemiological aspects of poisoning. Still, none of them included the patients' clinical profile, which is crucial for

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designing critical care units dedicated to the care of such patients.

The nationwide lock-down announced on March 24, 2020, by the Indian government in response to pandemic of COVID-19 has had tremendous impact on the health and well-being of the public, apart from the morbidity and mortality of COVID 19 infection. Recent literature during this pandemic revealed high levels of stress, anxiety, and depression in population.[12,13] A few reports of suicide and selfharm during the COVID-19 pandemic have been published.[14-20] As poisoning is directly related to the public's mental health[21-23] and well-being, we anticipated a change in the incidence pattern of poisoning patients presenting to ED due to COVID 19 induced nationwide lock-down. It would also be interesting to ascertain whether there were any changes in the toxic agents consumed and the severity of clinical symptomatology of such patients who presented in the two time frames of our study. Hence we planned to conduct a retrospective study on poisoning patients coming to the Emergency Department of our institute to analyse the incidence pattern and clinical profile of patients presenting in the ED before and during the pandemic and to identify any significant change in the patterns of the same due to the nationwide lock-down.

METHODS

Study design and setting

This retrospective, comparative cross-sectional study was conducted on acutely intoxicated patients presenting to the ED during the pandemic period (April 1-October 30, 2020 (period 2)), and a matching period before the pandemic (September 1, 2019 to March 31, 2020 (period 1)). This was conducted at Sree Gokulam Medical College and Research Foundation, Kerala, India.

Inclusion/exclusion criteria

All patients, irrespective of age and sex, registered in the ED with complaints of consumption of poison like medicines, alcohol, and chemical used in households, agriculture, and industries were included in the study. Patient charts with incomplete data, patients diagnosed with food poisoning, pregnant women, patients with snake bites, scorpion stings, or other insect bites were excluded from the study.

Data Collection

Data collection was initiated after getting approval from Ethical Committee (IEC) of SGMC & RF number *(SGMC IEC/44/570/04/2021/F)* dated 19/04/2021. The design and protocol of this observational retrospective study was approved. A semi-structured questionnaire was formatted, including demographics, comorbid illnesses; symptomatology; Type of poisons consumed, and clinical presentation of the patients. The semi-structured questionnaire was pre-tested with details of poisoning patients treated at the hospital. The nature of the toxic substance was identified by the patient's diagnosis report or patient's relatives.

Statistical Analysis

Variables studied were collected from EMR, such as time to presentation in ED, previous co-morbidities, history of psychiatric illness, symptoms, vital signs, clinical investigations, treatment management, etc. These data were expressed as mean, standard deviation, and percentage. Statistics was done using Statistical Package for the Social Sciences Software Package version 17 (SPSS; IBM Corp., New York, USA). Chi-square test, post hoc test, and the Spearman correlation coefficient were analysed to identify the significance between two periods. P-value less than 0.05 were considered as statistical significant.

RESULTS

Over fourteen months, we evaluated 111 poisoning patients who attended the emergency department. Out of these, 49 (44%) were male, and 62 (56%) were females. The majority belong to 15-24 years age (n=37, 33.3%), followed by 25-30 years in 20 cases, 35-44 years in 16 patients, <5-14 years in 17 patients, and >45 years in 21 patients, respectively. The mean age was 32.5 ± 26.5 years (CI: 95%, 3.5-48.5). The majority of the patients (86.4%) were from Trivandrum. We defined two time frames to record events related to poison ingestion and arrival to the ED. The first one was from (8:00 to 20: 00) while the second was from 20: 01 to 7: 59. Most of them (n= 84, 75.6%) had ingested the poison during the first time frame, while only 68 (61.2%) had presented to the ED in the first time frame (8 AM–8 PM). Remaining 43 (38.73%) had presented to the ED between 8:01PM–7:59AM.

In total, 68 patients presented between 8 am and 8 pm. About 57% patients presented within three hours of consumption of poison (Table 1). 51.5% of patients presented before lock-down at the ED. A substantial proportion of the patients (n=64, 57.6%) presented to ED within 3 hours of poison ingestion. Twenty-four patients (21.62%) had reached between 3-6 hours, and another 23 patients (20.72%) arrived after 6 hours of toxin ingestion. Fifty-seven patients who comprised 0.22% of the total ED census presented in the time frame before lock-down, while 54 patients who comprised 0.44 % of the total ED census presented during the lock-down. Forty-four patients had consumed multiple drugs, while paracetamol (n= 22, 19.8%) was the most common single poisoning agent in our study (Figure 1). With respect to co-morbidities, 40 (36%) patients had psychiatric disorders, and 17(15.31%) patients were hypertensives. 8.18% (n=9) cases had Diabetes Mellitus, and 1.8%(n=2) cases had coexistent coronary artery disease. Notably, 10.8% of the patients had coexistent thyroid dysfunction.

Clinical profile

Forty-one patients presented with tachycardia, which was the most common vital sign abnormality observed in the study population. While 4.5%(n=5) patients presented with bradycardia, 9.9%(n=11) patients had elevated Systolic BP, and 4.5%(n=5) patients had presented in shock (defined as a mean arterial pressure below of 65 mm of Hg). 14.4%(n=16) patients had respiratory distress, while 5.4%(n=6) of them had presented with oxygen saturation below 94% on presentation. The drugs which cause _____

Table 1. Clinical profile of poisoning patients and patient presentation to ED

Clinical Profile	Number of patients	Frequency
Length of Stay		
=>2 Hours	59	53.15%
2 – 4 Hours	48	43.24%
=> 4 Hours	4	3.6%
Disposition		
ICU	73	65.7%
DAMA	37	33.33%
Death	1	0.90%
Seizure		
Yes	3	2.7%
No	108	97.3%
Frothy Mouth		
Yes	4	3.6%
No	107	96.4%
Breathing difficulty		
Yes	2	1.8%
No	109	98.2%

Table 1. Continued

Clinical Profile	Number of patients	Frequency
Heart Rate		
Bradycardia<60	5	4.5%
Tachycardia =>100	41	36.93%
Mean Arterial Pressure		
<65	5	4.5%
>65	106	95.5%
Respiratory Distress		
Yes	16	14.41%
No	95	85.58%
Low GCS and Disorientation		
Yes	6	5.4%
No	105	94.6%
Shock		
Yes	5	4.5%
No	106	95.5%
Month of presentation of poisoning		
01/09/2019-31/03/2020	57(0.27% in total ED census)	51.35%
01/04/2020-30/10/2020	54(0.44%in total ED census)	48.65%

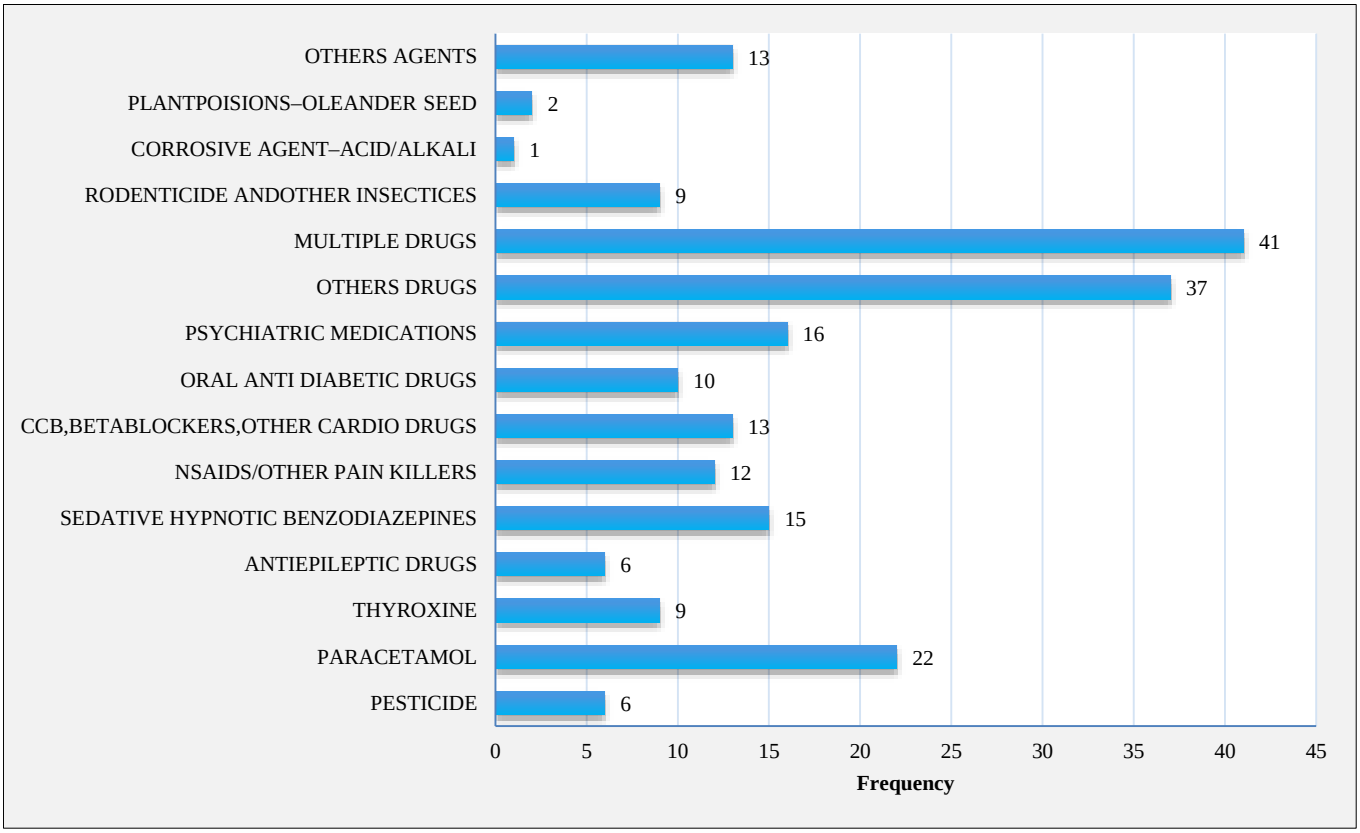

Figure 1. Type of poisons consumed

Tachycardia and Bradycardia are described in Figure 2. The predominant symptom of ED presentation was nausea and vomiting 29.7% (n= 33), followed by generalised tiredness 27.9% (n= 31). 5.4 % (n=6) patients had presented with Low GCS requiring endotracheal intubation, while 2.7% (n=3) patients presented with seizures (Table 2).

Outcome data -Disposition

ED disposition was categorized into admission, left against medical advice (LAMA), discharge, and mortality. 65.7 %(n=73) were admitted to ICU, 33.33%(n=37) were discharged against medical advice (DAMA). Death occurred to 0.9% (n=1) of the patients. It was a patient with rat poison ingestion who presented after 12 hours of ingestion in severe metabolic acidosis, was intubated, and admitted to the ICU where he suffered from cardiac arrest.

The majority of the patients, 53% (n=59), were disposed from the ED within 2 hours, while only 3.6% of patients had to wait for more than 4 hours for disposition from ED.

Among all the patients with poisoning, 41 patients consumed multiple poisons. Twenty-two patients consumed paracetamol, while 16 patients consumed psychiatric medications (Table 3) (Figure 1).

Before lock-down, 25 patients belonged to the less than 24 years age group, while during lock-down, 29 patients belonged to the same age group(p =0.3). Before lock-down, 33 patients were females, while during lock-down, 29 patients were females (p =0.67).

Table 2. Drugs causing Hypertension and Hypotension (SBP)

	Hypertension	Hypotension
Pesticide		
Paracetamol	1	1
Thyroxine		
Antiepileptic drugs	1	
Sedative hypnoticbenzodiazepines		1
NSAIDs/other pain killers		1
CCB, beta-blockers, other cardio drugs		
Oral antidiabetic drugs		
Psychiatric medications		1
Others drugs		1
Multiple drugs	1	2
Rodenticide and other insecticides		
Corrosive agent–acid/alkali		
Petroleum products–kerosene		
Camphor		
Plantpoisions–oleander seed		1
Other agents	2	
Drugs and other poison	1	
Total	59	9

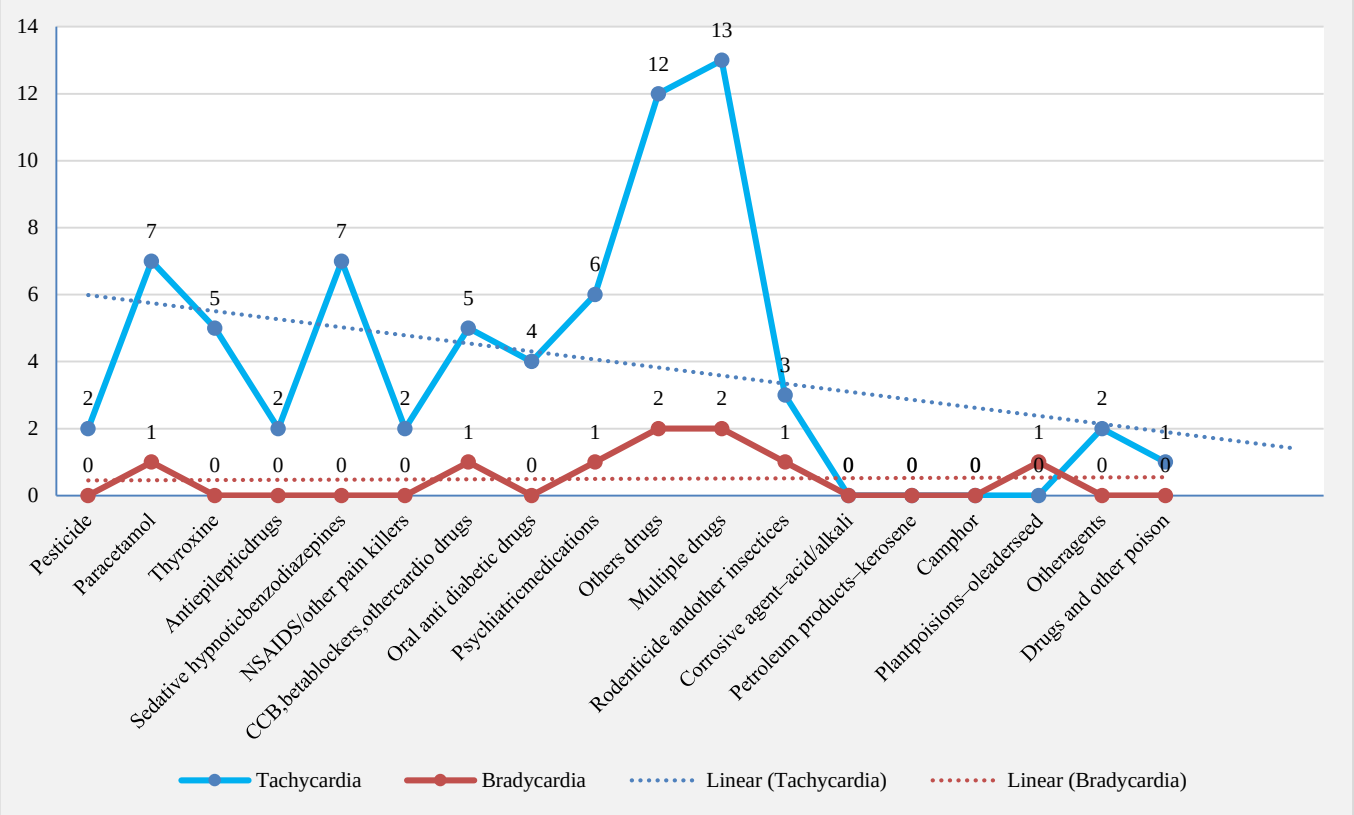

Figure 2. Drugs causing Tachycardia and Bradycardia

Table 3. Variation in incidence pattern of poisoning with reference to poisoning

	Month of presentation		P value
	01/09/2019-31/03/2020	01/04/2020-30/10/2020	
Age group			
< 24	25	29	0.3083
>25	32	25	
Gender			
Male	24	25	0.6626
Female	33	29	
Time interval between ingestion and presentation			
<3 Hours	34	30	0.12
3–6 Hours	14	10	
=>6 Hours	9	14	

Chi-square test

Before lock-down, 30 patients presented within 3 hours, while during lock-down, 34 patients presented within 3 hours (p =0.12). Among all patients, 40 patients had psychiatric disorders, and 12 patients had thyroid disorders.

Lockdown impact

We observed that among the patients aged below 24 years, there was an increase in incidence of poisoning during lock-down. The male: female ratio increased from 0.76 to 0.86 during lock-down. The predominant patient age group of patients observed in the study was 15-34 years (57%). There was no significant difference seen between the both periods regarding age (p=0.3)(Table 3).

Poisoning rate had slightly increased by 2.7% before pandemic (51.33%) in comparison to during pandemic (48.6%) period without significant difference (p=0.3).

Females were predominant in both periods. There were more females ingestions 26.12% (n=29) compared to male ingestions 22.5% (n=25) during the pandemic. But there was no significant difference observed between gender between the two periods (p=0.6626).

During the pandemic, 27.02% (n=30) of patients presented within 3 hours of ingestion, and 21.6 %(n=24) presented after the 3 hours of ingestion. There was significant delay recorded in the arrival of patients to ED during lock-down period (p=0.12) with increased hospital admission (p = 0.03). In total, before the pandemic, 59.6% of the patients could reach ED within 3 hours of ingestion, but during the pandemic, only 55.5% of the patients could reach ED within 3 hours of ingestion.

Predominantly 36.9% (n=41) patients consumed multiple poisons, 19.8% (n=22) consumed paracetamol, and 14.4% (n=16) patients consumed psychiatric medications.

DISCUSSION

This study aimed to explore the impact of COVID-19 pandemic on the pattern of hospital admissions due to poisoning. Majority of the cases arrived from rural areas. A total of 111 patients were registered in the ED with a history of poisoning in this study, which accounted for 0.44% and 0.27% of the total ED visits during the pandemic and before the pandemic, respectively. This poisoning rate is similar to Western countries' data ranging from 0.26% to 0.7%.[24,25] This high incidence of poisoning can be credited to the easy availability of poisons in India. The prevailing dogma is that mortality due to poisoning is associated with significantly less suffering than other means of self-harm.

In our study, the poisoning prevalence rate had slightly reduced by 2.7% during the pandemic (48.6%) period when compared to before pandemic (51.33%) (p=0.3). The reduction of rural admissions during the pandemic is best explained by the quarantine measures those restricted the transport facility from remote residents.[26] Neumann et al. showed decreased admissions of poisoned cases during lock-down, but they predicted that pandemic progression results in higher suicidal rates due to depression.[27]

In our study, high female preponderance was observed; similar observations were found in other studies. This pattern can be attributed to increasing challenges, family burden, stress, and females are more prone to risk than males.[28]

The majority (54%) of the poisoning cases were less than 25 years, which is comparable to other studies.[4,29]The high number of poisoning patients below 25 years of age can be attributed to increased peer pressure, stress, competitiveness, and heavy expectations from family or loved ones. The significant number of accidental poisoning among children (below 5years) can be attributed to chemicals/poisons stored in easily accessible places and lack of awareness among parents, resulting in an increase in accidental poisoning.[30] In our study, the decrease in pediatric cases during the lock-down was recorded than compared to before the pandemic, which is similar to Italy and Egypt studies.[31,32] The current study report regarding gender proportion was verified by study in Egypt.[32]

The popular time for ingestion of poison was the daytime (8 am to 8 pm) in 68 cases (61.26%), comparable to other studies.[33-35] This can be attributable to stress at working hours, school, agriculture, and home, making the victim more helpless to consume poison out of impulsivity. The prevalence rate of toxicity during the pandemic was 48.6% compared to before the pandemic period (p=0.3).

Among the poisons consumed, multiple drugs were consumed by a maximum number of patients, 36.93%(n=41), followed by paracetamol in 22 cases, psychiatric drugs in 16 cases, Benzodiazepine tablet overdose in 15 cases. The prevalence of psychiatric disorders in this study population was 36.03%, comparable to findings in other studies.[9,36] The current study showed that multiple drugs were the commonly reported toxicant during and before the pandemic. Studies conducted in Egypt shows that phosphide was the common encountered toxic agent in cases admitted to ED.[32] Acetaminophen exposure was the common toxic agent seen in Malaysia study (35.0%), and pesticides constituted 6.6%.[37] This pattern was noted in study of United Kingdom[38] and Saudi Arabia.[39] Studies in the US Turkey and Oman reported that analgesics are the most cause of poisioning.[40]

In our study, 16 cases were intoxicated with antipsychotic drugs; the prevalence of antipsychotic toxicants during the pandemic was comparable with other studies.[32,41,42] Studies from countries such as Pakistan[43], China[44], India[17], and Bangladesh[45], have raised the concerns regarding the increased suicide rate due to COVID-19.

The majority of the patients in this study were hospitalized for further treatment. A higher number of patients (65.7%) were admitted to the ICU, while 33.33% were discharged against medical advice from the ED, and 0.9% (n=1) patients died, which is comparable to other studies. Moreover, a bulk of the patients in this study completely recovered and were discharged after complete treatment. One patient who died in this study was admitted to the ICU with the consumption of rat poison.

Our study reported more delays in admission to the hospital during the pandemic, similar to Egypt and Nepal studies.[32,46] The late admission during the pandemic could be due to difficult access to transport facilities. Our study suggested that delayed presentations of patients more than three hours after ingestion to the ED during the pandemic may have delayed initiating resuscitative measures, which could be the possible factor that increased hospitalization during the pandemic.

There are some limitations in this study such as it is a single-center study, these results cannot be generalized, and they do not reflect the whole country's situation. The socioeconomic status of the patients was not recorded. As many patients consumed multiple agents, the clinical profile of the patients could not be attributed to the respective poisons.

CONCLUSION

A change in the incidence pattern was observed due to the COVID Pandemic, but the change was not statistically significant. COVID-19 pandemic reformed the usual intoxication pattern of the cases presenting to ED with higher multiple drugs and antipsychotic toxicity. The lock-down status was delaying hospital arrival time, which was reflected in a more extended hospital stay. Our study recommends restricting drug availability, educating regarding the pesticides, and starting psychiatric consultations, which help to reduce the suicide attempts. We also recommend that concerned authorities make online stress relaxation programs freely accessible to the public so that the mental health crisis triggered by the lock-down measures can be eased.

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