

Impact of COVID-19 pandemic on intensive care admissions and mortality due to self-poisoning: A retrospective comparative study from a tertiary care hospital

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ABSTRACT

INTRODUCTION COVID-19 struck the economies of every country, but the low- and middle-income countries had the most impact. Suicides during these times have increased, depicting the mental health of individuals. In this research, suicide rates and risk factors pre-COVID-19 and during the COVID-19 pandemic, as well as pre- and post-lockdown, were examined.

METHODS The study was comparative and conducted in 2021 with retrospective data taken pre-COVID-19 from an ICU setting in Karachi. All admitted patients, aged ≥ 14 years, due to self-poisoning were included in the study. Data on demographics, outcomes, and risk factors were compared in the pre- and post-COVID-19 periods using a questionnaire

and entered in SPSS and analyzed.

RESULTS We found a greater percentage of females ($n=135$; 62.2%) admitted for self-ingestion of poison compared to males ($p<0.29$) during both pandemic and pre-pandemic periods. A statistically significant difference has been reported in the pandemic and pre-COVID-19 periods for ICU length of stay (LOS) (8.5 ± 3.18 vs 6.8 ± 2 , $p<0.001$), APACHE II score (25.0 ± 8.1 vs. 22.3 ± 9.1 ($p=0.006$), and duration of mechanical ventilation (2.6 ± 4.2 vs 1.6 ± 2.6 ($p=0.019$).

CONCLUSIONS There was a significant rise in suicidal cases as well as morbidity in the COVID-19 period, indicating compromised mental health affecting the population.

INTRODUCTION

As indicated by the World Health Organization (WHO), viral illnesses proceed to develop and are a difficult issue. Over the recent twenty years, a few viral pestilences, for example, the extremely intense respiratory condition caused by SARS-CoV-1 corona virus, have been recorded. The outbreak of SARS-CoV-2 began in December 2019. On 11 February 2020, the WHO announced the official name of the sickness brought about by SARS-CoV-2 as COVID-19 (2019)¹.

Pandemics are not simply a general well-being concern; rather, they trigger grievous financial and mental health crises in the affected nations. Suicidality and suicides

in pandemics have been shown to be associated². At the community level, suicidal rates had increased during the Spanish flu, outbreak of bubonic plague, and continued to be reported in the following years during SARS and Ebola outbreaks^{3,4}.

According to the World Health Organization, 0.8 million people commit suicide every year⁵. On average, there is a suicide attempt every 40 seconds⁶. Asia accounts for 60% of the world's suicides, where 79% of global suicides occur in low- and middle-income countries (LMICs)⁷.

In South-East Asian countries, such as Pakistan, India, Sri Lanka, Bangladesh and Nepal, the practice of poison

ingestion is unfortunately common, but the impact of COVID-19 pandemic has created an alarming upsurge in this practice of self-harm^{8,9}. There is a paucity of available data in this regard. Various media reports echo the upsetting revelations of mounting trends in poison ingestion. These reports need an urgent interpretation.

LMICs with an already fragile healthcare infrastructure are highly vulnerable to health crises while dealing with pandemics like COVID-19. Moreover, in many critical care settings, clinicians and ICU staff are not adequately trained to assess mental healthcare. The present hospital-based study is designed to highlight the burden on the medical intensive care units (ICUs) due to self-ingestion of poison during the COVID-19 pandemic. Research from various settings, such as ICUs, highlighting suicidal trends, demographic features, and mortality during an ongoing pandemic is crucial to developing collaborative efforts at the global level to combat mental health threats¹⁰.

METHODS

After the approval of the ethical review board, this retrospective review of medical records was conducted at the medical ICU of a tertiary care hospital in Karachi during the COVID-19 pandemic years 2020–2021. All patients aged ≥14 years who were admitted to the medical ICU for deliberate self-ingestion of poison were included. The demographic features and outcomes of admissions with deliberate poisoning during the 1 March 2020–28 February 2021 (COVID-19 pandemic period) were compared with the same period in March 2019–February 2020 (pre-COVID-19 period). Data regarding number of admissions,

age, sex, marital status, employment status, history of any psychiatric illness, length of ICU stay, APACHE score, need for mechanical ventilation, and outcome (discharge, or death), were collected. These were used to compare self-ingestion of poison during lockdown (18 March–30 July 2020) and post-lockdown (1 August–31 December 2020). Associated risk factors for suicide were also examined.

Statistical analysis

Data were analyzed using the statistical software STATA (version 14.2). For continuous variables, mean and standard deviation (SD) are reported, whereas for qualitative variables, frequencies and percentages are given. The comparison between the COVID-19 and pre-COVID-19 periods was assessed using the chi-squared test or Fisher's exact test (for qualitative variables). An independent t-test was used to evaluate the difference after assessing normality, with statistical significance set at $p < 0.05$.

RESULTS

Among 915 all-cause admissions during the COVID-19 pandemic period, 217 (23.7%) were admitted to the medical ICU with deliberate ingestion of poison. In comparison, 120 ($n=1107$; 10.84%) admitted with the same intention in the pre-COVID-19 era (Table 1). The mean age of patients during the pandemic and pre-pandemic periods was 27.25 ($SD=9.86$) and 25.97 years ($SD=9.23$), respectively ($p=0.244$). The age group 14–25 years ($n=112$; 51.6%) was the most vulnerable group during both periods ($p=0.584$). Similarly, a greater percentage of females ($n=135$; 62.2%) were admitted for self-ingestion of poison compared to males ($p=0.29$)

Table 1. Comparison of admissions due to deliberate self-poisoning during COVID-19 pandemic (1 March 2020 – 28 February 2021) with the pre-COVID-19 period (1 March 2019 – 28 February 2020)

Characteristics	COVID-19 period n (%)	Pre-COVID-19 period n (%)	p ^a
Number of poison ingestion admissions	217.0	120.0	
Age (years)			0.584
14–25	112 (51.6)	65 (54.1)	
26–35	68 (31.3)	37 (30.8)	
36–45	20 (9.2)	9 (7.5)	
46–55	10 (4.6)	8 (6.6)	
≥56	7 (3.2)	1 (0.8)	
Gender			0.296
Female	135.0 (62.2)	67.0 (55.8)	
Male	82.0 (37.7)	53.0 (44.1)	
Unemployed	143.0 (68.5)	63.0 (52.5)	0.016*
Employed			<0.001*
Male	28.0 (26.9)	24.0 (58.5)	
Female	76.0 (73)	17.0 (41.4)	

Continued

Table 1. Continued

Characteristics	COVID-19 period n (%)	Pre-COVID-19 period n (%)	p ^a
Socio-economic status			<0.001*
Lower	88.0 (40.5)	78.0 (65)	
Lower middle	91.0 (41.9)	29.0 (24.1)	
Middle	38.0 (17.5)	13.0 (10.8)	
Marital status			0.405
Married	78.0 (35.9)	49.0 (40.8)	
Unmarried	102.0 (47)	47.0 (39.1)	
Divorced	17.0 (7.8)	14.0 (11.6)	
Widowed	20.0 (9.2)	10.0 (8.3)	
History of anti-depressant/ anti-psychotic medication	17.0 (7.8)	8.0 (6.6)	0.885
Having family history of psychiatric illness	6.0 (2.7)	3.0 (2.5)	1.000
Type of poison			0.917
Organo-phosphate compound	97.0 (44.7)	46.0 (38.3)	
Kerosine oil	11.0 (5)	8.0 (6.6)	
Rat-killer	35.0 (16.1)	20.0 (16.6)	
Benzodiazepines	10.0 (4.6)	6.0 (5)	
Tricyclic antidepressants	5.0 (2.3)	7.0 (5.8)	
Thyroxine	5.0 (2.3)	4.0 (3.3)	
Detergents	10.0 (4.6)	4.0 (3.3)	
Copper sulphate	5.0 (2.3)	3.0 (2.5)	
Hair dye	4.0 (1.8)	2.0 (1.6)	
Bleach	8.0 (3.6)	7.0 (5.8)	
Mosquito repellents	15.0 (6.9)	7.0 (5.8)	
Alcohol abuse	4.0 (1.8)	1.0 (0.8)	
Unknown	8.0 (3.6)	5.0 (4.1)	
Need for mechanical ventilation	72.0 (33.1)	41.0 (34.1)	0.854
Duration of mechanical ventilation (days), mean ± SD	2.6 ± 4.2	1.6 ± 2.6	0.019*
APACHE II score			0.003*
0–4	0.0 (0.0)	3.0 (2.5)	
5–9	6.0 (2.7)	11.0 (9.1)	
10–14	19.0 (8.7)	12.0 (10)	
15–19	24.0 (11)	18.0 (15)	
20–24	42.0 (19.3)	31.0 (25.8)	
25–29	64.0 (29.4)	22.0 (18.3)	
30–34	29.0 (13.3)	13.0 (10.8)	
>34	33.0 (15.2)	10.0 (8.3)	
ICU LOS (days), mean ± SD	8.5 ± 3.18	6.8 ± 2.08	<0.001*
Outcome			0.228
Discharge	187.0 (86.1)	109.0 (90.8)	
Death	30.0 (13.8)	11.0 (9.1)	

^a Independent samples t-test. ICU LOS: intensive care unit length of stay.

during both pandemic and pre-pandemic periods. Marital status (n=78; 35.9%) also was statistically insignificant (p=0.4).

The present study reports a higher percentage of patients from the middle to lower middle-income groups who attempted suicide during the pandemic compared to the

Table 2. Comparison of admissions due to deliberate self-poisoning during province-wide lockdown (18 March – 30 July 2020) and post lockdown (1 August –31 December 2020)

Characteristics	Lockdown n (%)	Post lockdown n (%)	p ^a
Number of poison ingestion admissions	89.0	92.0	
Age (years)			0.678
14–25	45 (50.5)	51 (55.4)	
26–35	27 (30.3)	24 (26)	
36–45	10 (11.2)	7 (7.6)	
46–55	5 (5.6)	5 (5.4)	
≥56	2 (2.2)	5 (5.4)	
Gender			0.360
Female	53.0 (59.5)	61.0 (66.3)	
Male	36.0 (40.5)	31.0 (33.7)	
Unemployed	26.0 (29.2)	55.0 (59.7)	<0.001
Employed			0.011
Male	11.0 (17.4)	15.0 (40.5)	
Female	52.0 (82.5)	22.0 (59.4)	
Socio-economic status			0.532
Lower	35.0 (39.3)	44.0 (47.8)	
Lower middle	35.0 (39.3)	32.0 (34.7)	
Middle	19.0 (21.3)	16.0 (17.3)	
Marital status			0.002*
Married	39.0 (43.8)	19.0 (20.6)	
Unmarried	31.0 (34.8)	55.0 (59.7)	
Divorced	10.0 (11.2)	7.0 (7.6)	
Widowed	9.0 (10.1)	11.0 (11.9)	
History of anti-depressant/anti-psychotic medications	4.0 (4.9)	7.0 (7.6)	0.604
Family history of illness	2.0 (2.2)	2.0 (2.1)	1.000
Fear of COVID-19	1.0 (1.1)	0.0 (0.0)	0.492
Type of poison			0.992
Organo-phosphate compound	41.0 (46.0)	42.0 (45.6)	
Kerosine oil	2.0 (2.2)	6.0 (6.5)	
Rat-killer	13.0 (14.6)	13.0 (14.1)	
Benzodiazepines	4.0 (4.4)	5.0 (5.4)	
Tricyclic antidepressants	3.0 (3.3)	2.0 (2.1)	
Thyroxine	2.0 (2.2)	3.0 (3.2)	
Detergents	4.0 (4.4)	3.0 (3.2)	
Copper sulphate	3.0 (3.3)	2.0 (2.1)	
Hair dye	2.0 (2.2)	1.0 (1.0)	
Bleach	3.0 (3.3)	4.0 (4.3)	
Mosquito repellents	6.0 (6.7)	5.0 (5.1)	
Alcohol abuse	2.0 (2.2)	2.0 (2.1)	
Unknown	4.0 (4.4)	4.0 (4.3)	
Need for mechanical ventilation	30.0 (33.7)	35.0 (38.0)	0.543
Duration of mechanical ventilation (days), mean ± SD	2.2 ± 3.6	3.6 ± 4.9	0.034*

Continued

Table 2. Continued

Characteristics	Lockdown n (%)	Post lockdown n (%)	p ^a
APACHE II score			0.006*
0–4	0.0 (0.0)	0.0 (0.0)	
5–9	3.0 (3.3)	3.0 (3.2)	
10–14	14.0 (15.7)	5.0 (5.4)	
15–19	17.0 (19.1)	7.0 (7.6)	
20–24	16.0 (17.9)	17.0 (18.4)	
25–29	14.0 (15.7)	31.0 (33.7)	
30–34	8.0 (8.9)	16.0 (17.3)	
>34	17.0 (19.1)	13.0 (14.1)	
ICU LOS (days), mean ± SD	7.2 ± 2.8	10.2 ± 3.2	<0.001*
Outcome			1.000
Discharge	76.0 (85.3)	78.0 (84.7)	
Death	13.0 (14.6)	14.0 (15.2)	

^a Independent samples t-test. ICU LOS: intensive care unit length of stay.

pre-COVID-19 period ($p < 0.001$) with one or two earning family members. Organophosphate compounds were the most frequently ingested poisons during both COVID-19 and pre-COVID-19 periods (44.7% vs 38.3%), and no significant difference was observed among other types of poison ingestion ($p = 0.917$). A statistically significant difference was found between the pandemic and pre-covid periods for ICU length of stay (LOS) (8.5 ± 3.18 vs 6.8 ± 2 , $p < 0.001$), APACHE II score (25.0 ± 8.1 vs 22.3 ± 9.1 ($p = 0.006$), and duration of mechanical ventilation (2.6 ± 4.2 vs 1.6 ± 2.6) ($p = 0.019$). However, the outcome (death or discharge) during both periods was not statistically significant.

We also compared the same variables between lockdown (March–July) and post-lockdown (August–December) (Table 2). A total of 328 and 402 patients were admitted during lockdown and post-lockdown periods, respectively. Of these, 89 (27%) were admitted for self-poisoning during the lockdown period, while 92 (22.8%) were hospitalized during the post-lockdown period. Supplementary file Figure 1 presents the factors that affected the suicidal rates and it was found that illiteracy increased the numbers in the pre- and COVID-19 periods.

DISCUSSION

The corona virus, aside from turning into a dreadful danger worldwide, is being considered as an indicator of mental imbalance and lack of social advancement³. The COVID-19 pandemic has influenced all sectors of the population including individuals living in destitute circumstances, people with handicaps, working youth, and indigenous groups of people. Early evidence shows that the welfare and financial effects of the infection are being endured excessively by individuals in the still evolving nations. For instance, people without access to day-by-day compensation

endured a heavy cost in this pandemic; evacuees, transients, or dislodged people additionally experienced the ill effects of the pandemic⁴.

Just like the standard practice in such pandemics, a lockdown is generally implemented to restrict the spread and lessen the possibility of new cases by shutting down every single social spot¹¹. Though it was demonstrated to contribute in controlling the disease, it had serious effects on the psychological well-being of the citizens¹². Worldwide, many studies indicate serious concerns regarding the growing effect of the ongoing pandemic on the mental health of the population. One of the major cultural effects of the coronavirus pandemic is a huge surge in the burden of ICU admissions and increased attempts at suicide, as shown in the 3rd major tertiary care hospital of the financial hub of Pakistan, i.e. Karachi^{13,14}. Recording of the timely data is the key to halting the drastic increase in cases of suicidal poison ingestion. The present study aimed to compare the burden on medical ICU admissions and outcomes of suicidal ingestion of poisons during COVID-19 pandemic (1 March 2020 – 28 February 2021) with the pre-COVID19 period (1 March 2019 – 28 February 2020). Critical care services in LMICs have already been facing challenges with poor resources and trained healthcare professionals. Almost all public sector tertiary care hospitals in Karachi are providing special care and intensive care facilities to COVID-19 patients, along with other major healthcare facilities with existing healthcare providers and resources. It had been extremely challenging in our low resource setting to cope with the increased burden of critically ill patients admitted with deliberate ingestion of poison with almost one-third of the available trained ICU staff.

We believe there are various suicidogenic factors, especially early marriages and illiteracy plaguing lives of

Asian females^{15,16}. Another facet is the soaring prevalence of domestic violence, whose rate has increased globally and particularly during the pandemic¹⁷. In 2017, a Korean study reported the risk factors affecting suicide rate in young and middle-aged adults and showed that low income and alcohol consumption played an important role¹⁸. According to UNICEF, because of the coronavirus induced lockdown, availability of education decreased, pushing more children into child labour¹⁹⁻²¹.

The next indicator in our study in suicidal attempts by poison ingestion was unemployment which increased after the ease in the lockdown, i.e. from August to December of 2020 in comparison with 2019²². The low-income countries have been hugely burdened by the wave of joblessness, which had a severe impact on the mental health of citizens²³, as also demonstrated in our study.

The devastating impact of the COVID-19 pandemic on the global economy and the deterioration in mental health might be associated with increased suicidal attempts and suicides. The present study has observed a significant increase in suicidal attempts with deliberate ingestion of poison requiring ICU admission in the dwellers of the largest city of Pakistan, during the pandemic compared to the pre-pandemic period.

According to our study, in the year 2020, around 160 cases (41.29%) were reported of self-poisoning compared to 88 (16.99%) in 2019. Clearly, there was a surge of poison ingestion in the urban population during the pandemic. Through the lockdown due to the pandemic, even Karachi, which is the 3rd largest city in the world, faced an alarming set-back to its revenue, affecting the incomes and livelihood of almost all groups of earners of the city.

Growing concerns regarding potential mental health crises during the COVID-19 pandemic leading to higher suicidal attempts and suicides have been raised by many researchers across the globe²⁴. According to WHO data, men commit suicide at 2–4 times the rate of women^{6,25}. In contrast, our study has shown female predominance in death rates, as supported by studies in India^{24,26}.

Pakistan has a young population (63%) according to WHO. Our study has clearly shown that⁶ around 50% of young adult cases of ingestion were reported during the COVID-19 pandemic in contrast to a nation-wide study in France, reporting more suicides by the elderly⁸. Our study also shows that there is a dire need of authorities' rapid attention.

Our study found a direct relation between severity of ingestion and the need for ventilatory support and hospital stay. A study conducted in India²⁴ also showed that the cases with OPP ingestion had more severity in their course of hospital stay. The number of patients requiring ventilator support during March–July 2019 was 20 (51.28%) compared with 39 (60%) during the lockdown period, March–July 2020. A study from Bangladesh also supports our observation²⁷. In contrast, studies from the west have shown a decrease of 8.5% in hospital admissions due to suicide

during the lockdown^{28,29}.

Another striking finding that has surfaced from our study is the copious use of OPP (organophosphate poisoning) and rat-killer pesticides as the ingestion material. Around 99 (51.13%) patients had used OPP compounds as the type of poison in 2020 compared to 44 (49.60%). This was used by males and females as it is readily available without check. A study from Nepal also states that OPP compounds are the most frequently used self-ingestion materials in Asian countries²⁸. Their easy availability and economical prices are responsible for growing incidences of poisoning and is becoming a chief reason for OPP ingestion for suicide purpose³⁰. In contrast, in Western countries, suicide from firearms, opioids and alcohol overdose, are common methods in the ongoing COVID-19 pandemic^{17,31,32}.

While comparing the suicidal ingestion cases month-wise, there was a clear and constant rise in the number of admissions in the intensive care unit in the year 2020 compared to 2019. Domestic violence was a risk factor and was taken into consideration. Our study highlighted that among the risk factors of suicide, illiteracy has the highest contribution compared to a non-representative study utilizing only 7 cases stating that social isolation distancing has the highest contribution³².

A very alarming finding of our study is that only 2.2% of participants had a known psychiatric illness and around 97.8% had no known histories or family histories of any psychiatric illness. This massive difference evidently indicates that the pandemic has taken a great mental toll even on the lives of the urban inhabitants³³. Ingestion of poison or taking an overdose of drugs with suicidal intent accounts for more than 80% of deliberate self-harm in Sri Lanka. In contrast, psychiatric illnesses are the leading cause of suicide of all forms in the western countries³⁴.

Our study has shown that the amount of poison ingestion during and after the lockdown of the COVID-19 pandemic is significantly higher compared to 2019. There is a clear increase of 32.31% in March–July and 27.41% in August–December. However, there is a scarcity of literature to compare in this regard. Also, the increased amount is directly proportional to the severity of the patient's condition.

Limitations

Limitations must be noted, as other factors that can influence suicide such as current mental health status, were not assessed. A regression analysis could have been applied, while other modalities of self-harm were not compared. Further research with retrospective multi-center studies is needed to yield better results.

CONCLUSIONS

Accelerated cases of self-ingestion of poison during the current pandemic are placing enormous strain on the intensive care system, as a large number of cases require intensive care management, including ventilatory support.

The devastating consequences of the COVID-19 pandemic on the population's mental health can be reduced by providing mental health services, optimizing psychiatric emergency care services, and training intensive care staff.

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The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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Ethical approval was obtained from the Ethical Review Board (IRB) of the Karachi Medical and Dental College (Approval number: 05/21; Date: May 2021). This study was a retrospective review of patient medical records, so participant informed consent was not required.

DATA AVAILABILITY

The data supporting this research are available from the corresponding author on reasonable request.

PROVENANCE AND PEER REVIEW

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