

# Retrospective evaluation of patients who ingested drugs to commit suicide

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## Abstract

**Aim:** To analyze patients presenting to our hospital after ingesting drugs for suicide purposes.

**Materials and Methods:** Adult patients that attempted suicide by ingesting drugs or other substances were retrospectively reviewed over a two-year period. The population of the study was determined among the patients diagnosed with the ICD-10 codes of X.40-X49 in hospital records. The patients were divided into two groups as hospitalized and discharged, and evaluated in terms of age, gender, substances ingested, number of different types of drugs ingested, the statement of life threatening status in forensic reports, whether gastric lavage or activated charcoal was applied, history of previous suicide attempts, presence of psychiatric diagnoses, and leukocyte count. Then, we investigated any statistical differences between the two groups.

**Results:** A total of 216 adult patients with a mean age of  $27.65 \pm 9.45$  years were included in the study. The hospitalization rate was 49.1%. Taking two or more different types of drugs, a high leukocyte count, application of gastric lavage and active charcoal, and the presence of life-threatening status in forensic report were found to be higher in the hospitalized group ( $p < 0.05$ ). It was observed that a history of previous suicide attempts or previous psychiatric diagnoses did not affect the hospitalization rate ( $p > 0.05$ ). In addition, it was determined that for suicide purposes, psychiatric drugs were mostly taken by the patients with previous psychiatric diagnoses while those without these diagnoses mostly used analgesics to attempt suicide ( $p < 0.001$ ).

**Conclusion:** Multiple drug type ingestion, leukocyte count, the presence of a life-threatening status in the forensic report, and gastric lavage and activated charcoal applications were determined as factors affecting the decision of emergency physicians to hospitalize patients that attempted suicide by ingesting drugs.

**Keywords:** Emergency; intoxication; suicide

## INTRODUCTION

Intoxication is the destruction or injury of cells by inhalation, ingestion, injection or absorption of a toxic substance. An individual can be exposed to intoxication accidentally or intentionally for self-harming purposes or suicide. While accidental intoxication mostly occurs due occupational risks and home accidents, self-harming situations depend on the availability of drugs (1). The latter behavior is defined as suicide if such an act results in death and attempted suicide if the person survives (2).

It is estimated that every year, more than 1 million people in the world commit suicide, and it is predicted that this number will progressively increase in the next years if no measures are taken (3). According to the World Health Organization, suicide-related deaths rank second among the causes of death between the ages of 15-29 years (4). Suicide may also be the underlying reason for

some deaths with unknown causes. A suicide can involve the use of firearms, jumping from height, or ingesting excessive drugs. It is important to identify and prevent the underlying reason for suicide. Suicide attempts are more common among young people, women, and individuals with psychiatric problems (5).

In making clinical decisions, it is important to know whether the drug ingested during a suicide attempt was at a toxic dose and whether it has an available antidote. It is very difficult for physicians to make a decision to discharge or hospitalize a case for which the dose or amount of drug ingested is not known. Management of intoxication cases differs according to the number and type of drugs taken. The use of additional medication can further complicate the management of these patients (6).

Every case of intoxication should be evaluated not only medically but also forensically. The statement of any life-

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threatening status in forensic reports, which seems easier to investigate and conclude in cases of physical trauma, is relatively more difficult to assess in cases of intoxication. In forensic terms, indications of a life-threatening condition are accepted as ingesting a drug at a toxic dose, unconsciousness, intubation or dialysis requirement, or organ failure. Physicians facing intoxication cases should obtain a detailed history of the patient and record all the information they can get about how intoxication occurred (7).

In drug intoxications, there are no exact algorithms to guide the hospitalization or discharge decision. In this study, we evaluated patients that attempted suicide by ingesting drugs to investigate whether medical history, number and type of ingested drugs, gender, and applied treatments had an effect on emergency physicians' decision to hospitalize or discharge these patients. Thus, it was aimed to determine the factors that may have an impact on hospitalization in order to help physicians better manage intoxication cases.

## MATERIALS and METHODS

### Study Design and Setting

This descriptive retrospective study was conducted over a two-year period (2018 and 2019) in the emergency medicine clinic of a tertiary hospital with patients aged 18 years or older who attempted suicide by ingesting drugs or other substances. Prior to the study, approval was obtained from the local scientific research and publication ethics committee (approval number: 2020/5-39). Since it was a retrospective study, patient consent form was not obtained.

### Study Population and Protocol

Patients that ingested drugs or other substances for suicide purposes in 2018 and 2019 were identified from the hospital registry system by the ICD (International Classification of Disease ) codes. In this period, 265 patients who were diagnosed using the code X 40-X 49 (Accidental poisoning by and exposure to noxious substances, ICD- 10 version 2019) were identified from hospital records. Patients that attempted suicide by hanging or using sharp objects, accidental intoxication cases, patients under the age of 18 years, pregnant women, and patients that did not have a forensic report in the hospital system were not included in the study. Cases with any missing information in terms of the investigated variables were also excluded. In light of these criteria, 49 patients were excluded from the study and the study was conducted with the remaining 216 patients. The primary outcome of the study is to determine the hospitalization rate in intoxication cases.

The characteristics of the patients, such as age, gender, type and amount of substances ingested, emergency interventions applied, clinical outcome, presence of psychiatric diagnoses, history of repeated suicide attempts, and leukocyte count were examined. In addition, the forensic records kept by emergency physicians were examined to confirm the patients' information and identify the statement about life-threatening status of cases.

The patients were divided into two groups as those that were hospitalized and those that were discharged. The statistical differences between these two groups in terms of age, gender, substances ingested, number of types of drugs ingested, presence of a life-threatening status, gastric lavage application, activated charcoal administration, history of previous suicide attempts, previous psychiatric diagnosis, and leukocyte count were investigated. Considering that hospitalized patients would show more severe signs of intoxication, we aimed to determine the clinical and demographic data of these severe intoxication cases. In addition, we divided the patients into two groups as those with and without previous psychiatric diagnoses. Similarly, we compared these two groups in terms of gender, number of types of drugs ingested, presence of a life-threatening status, and the group to which the ingested substance belonged.

Drug groups were determined according to the active substance and the intended use of the drug. Drugs used in chronic diseases, such as diabetes, hypertension, and goiter were classified as the internal medicine group. Antipsychotics and antidepressants were included in the group of psychiatric drugs. The agricultural chemicals group mostly consisted of pesticides, insecticides, herbicides, and rodenticides. Taking drugs from more than one category was referred to as multi-group drug ingestion.

### Statistical Analysis

SPSS version 17.0 was used for statistical analysis. The compliance of the continent data to normal distribution was determined by the Kolmogorov-Smirnov test. Data fitting normal distribution were analyzed using Student's t-test while those that were not normally distributed were analyzed using the Mann-Whitney U test. Quantitative data were shown as mean  $\pm$  standard deviation or median (min-max) values. The chi-square test was used to compare qualitative data. Categorical variables were expressed as numbers and percentages. The percentages were rounded up if necessary. P values of <0.05 were considered statistically significant.

## RESULTS

Over the two-year period, a total of 216 patients with a mean age of  $27.65 \pm 9.45$  (range 18-65) years were included in the study. While 50.9% of the cases were discharged from the emergency department, 38% were admitted to the services and 11.1% to intensive care unit. Of all patients, 67.6% were women, with age and gender not significantly differing between the hospitalized and discharged groups ( $p > 0.05$ ). The rate of those that ingested more than one type of drug was 30% in the discharged group and 44.3% in the hospitalized group, indicating a statistically significant difference ( $p = 0.029$ ). According to the forensic reports, 75.5% of the hospitalized patients had a statement of life-threatening status. It was also determined that 92.5% of the hospitalized cases underwent gastric lavage and 94.3% were given activated charcoal. These rates were significantly higher compared to the discharged patients ( $p < 0.001$  for both).

It was observed that 35 patients had multiple suicide attempts over the two-year period, and 60% of these patients were discharged. While 48.1% of the hospitalized patients had previous psychiatric diagnoses, this did not affect the hospitalization rate statistically ( $p = 0.902$ ). In order of frequency, the groups of drugs ingested were determined as psychiatric drugs, analgesics, internal medicine drugs, corrosive substances, agricultural chemicals, antibiotics, and antiepileptics. In addition, 25.9% of the patients simultaneously ingested multi-group drugs. The median leukocyte value was measured as 10,400/uL for the hospitalized patients and 8,600/uL for the discharged group, showing a statistical difference between the two groups ( $p = 0.041$ ) (Table 1).

Of the patients who had previous psychiatric diagnoses, 44.7% ingested psychiatric drugs for suicide purposes

and 26.2% simultaneously took multi-group drugs. In the group without any previous psychiatric diagnosis, mostly analgesics were taken to attempts suicide (23%), and the rate of multi-group drug ingestion was 25.7%. The presence of a psychiatric diagnosis was found to affect the drug group ( $p < 0.001$ ). In addition, the patients with psychiatric diagnoses were found to have a higher rate of prior suicide attempts ( $p = 0.002$ ). However, a previous psychiatric diagnosis did not affect gender, presence of a life-threatening status, and number of drugs ingested ( $p > 0.05$ ) (Table 2). Although there was no significant difference between the months of patient presentation and hospitalization rate, the highest number of suicide attempts was observed in February (13%), followed by July (10.2%), and August (9.7%) (Figure 1).

**Table 1. Factors affecting the decision to hospitalize**

	Total (n = 216)	Discharged (n = 110)	Hospitalized (n = 106)	p-value
<b>Gender</b>				
Female	146 (67.6%)	70 (63.6%)	76 (71.7%)	0.206
Male	70 (32.4%)	40(36.4%)	30 (28.3%)	
<b>Number drug types</b>				
One	136 (63%)	77 (70%)	59 (55.7%)	0.029
≥Two	80 (37%)	33 (30%)	47 (44.3%)	
<b>Life-threatening status*</b>				
Present	110 (50.9%)	30 (27.3%)	80 (75.5%)	<0.001
Absent	106 (49.1%)	80 (72.7%)	26 (24.5%)	
<b>Gastric lavage</b>				
Applied	169 (78.2%)	71 (64.5%)	98 (92.5%)	<0.001
Not applied	47 (21.8%)	39 (35.5%)	8 (7.5%)	
<b>Active charcoal</b>				
Applied	173 (80.1%)	73 (66.4%)	100 (94.3%)	<0.001
Not applied	43 (19.9%)	37 (33.6%)	6 (5.7%)	
<b>Repeated attempt</b>				
Present	35 (16.2%)	21 (19.1%)	14 (13.2%)	0.241
Absent	181 (83.8%)	89 (80.9%)	92 (86.8%)	
<b>Psychiatric diagnosis</b>				
Present	103 (47.7%)	52 (47.3%)	51 (48.1%)	0.902
Absent	113 (52.3%)	58 (52.7%)	55 (51.9%)	
<b>Drug groups</b>				
Analgesics	36 (16.7%)	20 (18.2%)	16 (15.1%)	0.308
Antibiotics	7 (3.2%)	6 (5.5%)	1 (0.9%)	
Antiepileptics	5 (2.3%)	2 (1.8%)	3 (2.8%)	
Corrosives	9 (4.2%)	6 (5.5%)	3 (2.8%)	
Psychiatric drugs	53 (24.5%)	27 (24.5%)	26 (24.5%)	
CVDs drugs	3 (1.4)	1 (0.9%)	2 (1.9%)	
Internal medicine drugs	20 (9.3%)	7 (6.4%)	13 (12.3%)	
Agricultural chemicals	9 (4.2%)	5 (4.5%)	4 (3.8%)	
Other	18 (8.3%)	12 (10.9%)	6 (5.7%)	
Multi-group drug	56 (25.9%)	24 (21.8%)	32 (30.2%)	
<b>Age</b>	25 (18-65)	26 (18-65)	24.5(18-59)	0.499
<b>WBC count</b>	9.5(4.2-28.2)	8.6 (5-19.6)	10.4(4.2-28.2)	0.041

**P < 0.05 is statistically significant; CVDs: cardiovascular diseases; WBC: white blood cell; \*the statement about life threatening status of patient on forensic report**

Table 2. Analysis of previous psychiatric diagnosis according to certain variables

	No previous psychiatric diagnosis (n = 113)	Previous psychiatric diagnosis present (n = 103)	p value
<b>Drug group</b>			
Analgesics	26 (23%)	10 (9.7%)	<0.001
Antibiotics	5 (4.4%)	2 (1.9%)	
Antiepileptics	4 (3.5%)	1 (1%)	
Corrosives	7 (6.2%)	2 (1.9%)	
Psychiatric drugs	7 (6.2%)	46 (44.7%)	
CVDs drugs	2 (1.8%)	1 (1%)	
Internal medicine drugs	18 (15.9%)	2 (1.9%)	
Agricultural chemicals	6 (5.3%)	3 (2.9%)	
Other	9 (8%)	9 (8.7%)	
Multi-group drug	29 (25.7%)	27(26.2%)	
<b>Repeated attempt</b>			
Present	10 (8.8%)	25 (24.3%)	0.002
Absent	103 (91.2%)	78 (75.7%)	
<b>Gender</b>			
Female	76 (67.3%)	70 (68%)	0.912
Male	37 (32.7%)	33 (32%)	
<b>Life-threatening status</b>			
Present	54 (47.8%)	56 (54.4%)	0.334
Absent	59 (52.2%)	47 (45.6%)	
<b>Number of drug types</b>			
One	73 (64.6%)	63 (61.2%)	0.601
≥Two	40 (35.4%)	40 (38.8%)	

P < 0.05 is statistically significant; CVDs: cardiovascular diseases

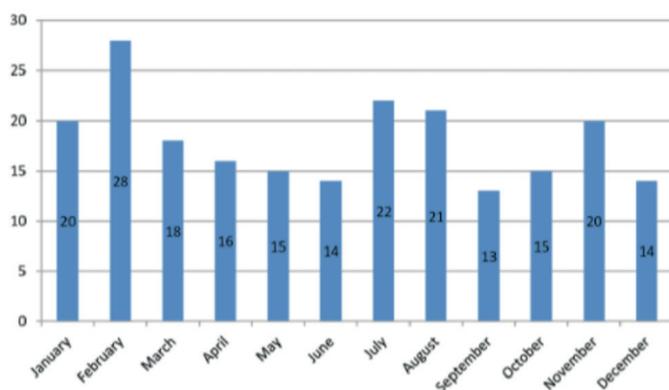


Figure 1. Distribution of suicide attempts by month

## DISCUSSION

Attempted suicide has become an increasing public health problem with drug ingestion being one of the most common methods used. The incidence of suicide attempts is higher in young patients and females, especially those with psychiatric problems (5,8,9). This is supported by the results of our study. Our sample mostly consisted of young and female patients. However, age and gender did not have a statistically significant effect on the rate of hospitalization.

A history of a previous suicide attempt is an important risk factor for repeated suicide attempts (10). In our study, 35

patients had previously attempted suicide. We consider that repeated suicide attempts are seen at a level that should not be overlooked. However, according to our results, having a history of previous suicide attempts did not statistically affect the hospitalization rate. There was also no relationship between repeated suicide attempts and gender.

The literature contains studies reporting an association between the presence of previous psychiatric diagnoses and suicide attempts (11,12). In contrast, there are also researchers showing a low level of relationship between psychiatric diagnoses and suicide attempts (13). In our study, we determined that almost half of the patients had previous psychiatric diagnoses, which is consistent with some of the studies in the literature. However, there was no statistical difference in the hospitalization rate according to the presence or absence of psychiatric diagnoses.

In this study, the majority of the patients ingested a single type of drug for suicide purposes. In contrast, Guneyasu et al. (14) reported that ingestion of more than one type of drug was statistically significant for hospitalization. However, we observed that the group of the ingested drug did not have an effect on the hospitalization decision.

Having a history of psychiatric diagnoses and attempted suicides creates higher risk of repeated suicide attempts.

An accurate identification of these patients, determining underlying factors, and eliminating these factors if possible can help prevent further suicide attempts (15,16). In our study, having previous psychiatric diagnoses was found to be related to repeated suicide attempts. It was observed that patients who had previous psychiatric diagnoses had also previously attempted suicide mostly by ingesting psychiatric drugs. The patients without previous psychiatric diagnoses mostly attempted suicide with analgesics. We consider that the patients tended to use their own prescription drugs for suicide purposes due to their availability. In addition, in the literature, it has been emphasized that drugs, especially antidepressants may cause a susceptibility to suicide attempts in the first 15 days of use (15). This may be a further reason why suicide attempts were more common among the psychiatric patients. However, in this study, having previous psychiatric diagnoses was not associated with gender, multi-group drug ingestion, and forensic life-threatening status.

It was determined that in the hospitalized group, the rate of patients that underwent gastric lavage and the rate of those given activated charcoal were higher compared to the discharged patients. In addition, the leukocyte count was higher in the hospitalized patients. Leukocytes are biochemical values that can rise early in the acute phase, and have the advantages of easy evaluation that can be performed in most healthcare settings. However, there are no studies in the literature investigating leukocyte values in patients hospitalized after suicide attempts. In terms of the treatments applied, gastric lavage and activated charcoal were applied at a higher rate in our study compared to similar studies (10). This difference can be attributed to the time elapsed from the ingestion of the drug used to attempt suicide to the arrival at the hospital.

The presence of forensic life-threatening cases of intoxication in the acute period can be difficult for physicians to make clinical decisions (17). In the current study, there was a relationship between the presence of a forensic life-threatening status and hospitalization. Indeed, the presence of a real life-threatening condition requires hospitalization. The indication of a life-threatening status in the forensic report may influence physicians' decision to hospitalize patients.

Aguglia et al. (18) showed that lethal suicide attempts peaked in months when people were exposed to higher sunlight (June and July). In our study, the highest number of suicide attempts occurred in February, followed by July and August. We considered that the relationship between suicide attempts and certain seasons or months of year may be related to the person experiencing mood changes.

## LIMITATIONS

First of all, the main limitations of our study are its retrospective design and low number of patients. Information on the time from suicide attempt to presentation to the emergency department, complaints

at the time of admission and clinical outcomes of the patients who were hospitalized were not included in the study. A study to be conducted with a larger number of patients by eliminating these deficiencies will yield more valuable results.

## CONCLUSION

Suicide attempts by ingesting excessive drugs are becoming an increasingly serious problem. It is vital that emergency physicians appropriately manage intoxication cases. In this study, the factors affecting the hospitalization decision in patients that attempted suicide were found to be ingestion of different types of drugs, high leukocyte count, gastric lavage application, active charcoal application, and the presence of life-threatening statement in forensic report. In cases of suicide attempts with these features, it should be estimated that the situation is serious and the patient should be hospitalized in consultation with a psychiatry or intensive care specialist.

In addition, it was observed that the patients with previous psychiatric diagnoses had a higher rate of repeated suicide attempts and they mostly took psychiatric drugs for this purpose. We hope that our study, which examined the factors affecting the hospitalization decision in drug intoxication cases that can sometimes be complicated to manage, will guide emergency physicians.

*Competing Interests: The authors declare that they have no competing interest.*

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*Ethical Approval: The study was approved by the Adiyaman University Local Ethics Committee (Decision No. 2020/5-39).*

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