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Evaluation of Patients Admitted to Intensive Care Unit with Drug Intoxication: Retrospective Analysis of 203 Patients

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ABSTRACT

The purpose of the present study was to retrospectively analyze the demographic and clinical characteristics of acute drug intoxication patients admitted to the emergency and Intensive Care Unit for follow-up and treatment.

The records of the patients who were hospitalized in the Intensive Care Unit with the diagnosis of acute drug intoxication between 01.01.2018 and 01.01.2023 in the Karaman Training and Research Hospital were scanned from the hospital data system.

A total of 203 patients (77 men and 126 women) were included in the study. The mean age was found to be 30.83±12.12. The number of patients who had suicidal intoxication was 183 (90%). It was determined that the most common agents of drug intoxication were analgesics (n=94, 46%), antidepressants (n=59, 29%), and antibiotic drugs (n=19, 9.4%). There was a history of depression in 113 (56%) of the patients. The median (IQR) GCS of the cases at the time of admission was 15 (0), and the mean APACHE II Score was 2.16±4.22. A significant relationship was detected between low GCS and increased APACHE II Scores and prolonged stays in the Intensive Care Unit.

It was determined that acute drug intoxications occur to commit suicide with rapidly accessible drugs such as analgesics and antidepressants. It is considered that it would be more appropriate to follow-up patients who do not have an indication for Intensive Care Unit hospitalization in emergency departments or wards in terms of improving capacity management.

Keywords: Drug intoxication, Intensive Care Unit, Poisoning

Introduction

Intoxication is the disruption of the normal functions of the body because of the intake of a toxic agent that might harm the body or the ingestion of a non-toxic agent in high doses. It may occur as a result of accidental intake of the drug or substance without realizing it or due to suicidal intentions. An increase in the frequency of cases of oral poisoning has been observed in recent years (1). The annual incidence of suicide or accidental poisoning is within the range of 0.02-0.93% in developed countries and continues to increase every year worldwide (2, 3).

Intoxications generally constitute 0.4-1.57% of emergency department admissions in our country, and drug intoxications are included at the top of the list (4). According to a report published by the American Association of Poison Control Centers (AAPCC) in the USA in 2003, in all poisoning cases, the most common drugs were analgesic drugs (13.7%), followed by antipsychotics, hypnotic drugs, sedative drugs (10.5%), and antidepressant drugs (8.1%) (5). According to the report published in 2020, analgesics again ranked first with a rate of 10.3%, followed by antidepressants (5.30%) and sedative/hypnotic/antipsychotic (4.92%) medication (6).

Drug intoxication might cause severe consequences depending on the exposure factor and the duration of admission to the hospital, and some patients need Intensive Care Unit (ICU) care for further examinations, treatments, and follow-ups (4, 5). Between 3.4 and 13.8% of patients admitted to the emergency department because of intoxications are followed up in the ICUs, which has increased to 37% in Turkey (7-9). The mortality rate because of drug intoxication is 2.1% in intensive care patients (10).

Knowing the general intoxication profiles in an area is a critical factor for helping to detect and

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manage intoxication early and will also reduce morbidity and mortality rates. For this reason, detailed analysis and profile of intoxication cases are important to increase the efficiency of healthcare services and protect health (1).

The present study aimed to retrospectively evaluate the age and gender distribution, etiological agents, length of stay, and admission time to the emergency departments after taking the medication in patients admitted to the emergency department because of oral medication intake and hospitalized in the ICU for follow-up and treatments.

Materials and Methods

The study was designed following the principles set out in the Declaration of Helsinki with the approval of the ethics committee (No: 01-2023/18) on January 19, 2023. Two hundred three patients over the age of 18, who applied to the emergency department of the Karaman Training and Research Hospital because of acute drug intoxication between 01.01.2018 and 01.01.2023, were hospitalized in the ICU were included in the study. Exclusion criteria were having no available data in the hospital system, being under the age of 18, being hospitalized not for 24 hours yet, and being followed up in the wards.

In the present study, the purpose was to retrospectively analyze the demographic and clinical data, prognosis, and related factors of the patients admitted to the emergency department with the diagnosis of drug intoxication and treated in the adult ICU using the hospital's electronic record database. The age, gender, exposure to drugs (suicide, accidental overuse), presence of psychiatric diseases, drug or substance causing intoxication, hours of hospital admission, admission times after drug intake, number of days in ICU, Glasgow Coma Scale (GCS), Acute Physiology and Chronic Health Evaluation (APACHE II) scores, complications, presence of organ involvement, prognosis and mortality of the patients were evaluated.

Statistical Analysis: Categorical variables were described with frequency and percentage statistics. Mean, standard deviation or median (IQR) statistics were given for numerical variables.

The Mann-Whitney Test was used in the analysis of the numerical variables, and the Chi-Square was used in the analysis of the categorical variables. The Spearman Correlation Test was used for correlation. Analyzes were made with the R 4.2.2 program, and $p<0.05$ was considered significant.

Results

A total of 203 patients who were admitted to the ICU between 01.01.2018 and 01.01.2023 with the diagnosis of drug intoxication were evaluated in the study. Among the patients admitted to the ICUs, 126 (62%) were female and 77 (38%) were male. The ages of the patients ranged between 18 and 81 years, and the mean age was 30.83±12.12 (Table 1). The mean age of males was 31.83±12.52, and that of females was 30.22±11.88. No statistical differences were detected between the two genders ($p=0.25$). (Table 1). The majority of cases (94%) were in the 18-35 age range. (Table 1). A total of 20 patients had taken medication accidentally, and the others had attempted suicide.

Only 56% of the cases of suicidal poisoning had a previously diagnosed depressive disorder (Table 2). Among the patients, 48 of the men and 65 of the women had a diagnosis of depression in their anamnesis. Considering the types of drugs they took, analgesic (46%) drugs were the first, followed by antidepressants (29%) and antibiotics (9.4%). The mean number of drugs taken was 22.74±12.22 (Table 2). A statistically significant difference was detected between the number of drugs taken for suicide (23.84±12.06) and the number of drugs taken accidentally (12.65±8.72) ($p<0.001$) (Table 3).

The most admissions to the emergency department with poisoning were made between 20.00 and 23.59 hours. The number of patients admitted during this time period was 44 (Figure 1). The mean time to admission to the hospital was 2.37±2.38 hours. The duration of hospitalization in the ICU was a minimum of 1 and a maximum of 12 days. The length of stay in the ICU in all drug intoxication cases was 347 days.

The vital signs of 198 patients were stable at the time of admission to the ICUs. Renal failure developed in one of the four suicide attempts and in a patient who took drugs accidentally. A patient who received high-dose Methamphetamine received mechanical ventilation support for 6 days after respiratory failure developed in the ICU, and inotropic-vasopressor support was used. No complications developed in any of the patients whose vital signs were stable during hospitalization.

Although 48 of the patients were discharged from the ICUs to the wards, 155 were discharged from the ICUs directly with recovery, 16 patients were followed up in the closed ward as a result of the evaluation made by the internal medicine, and 32

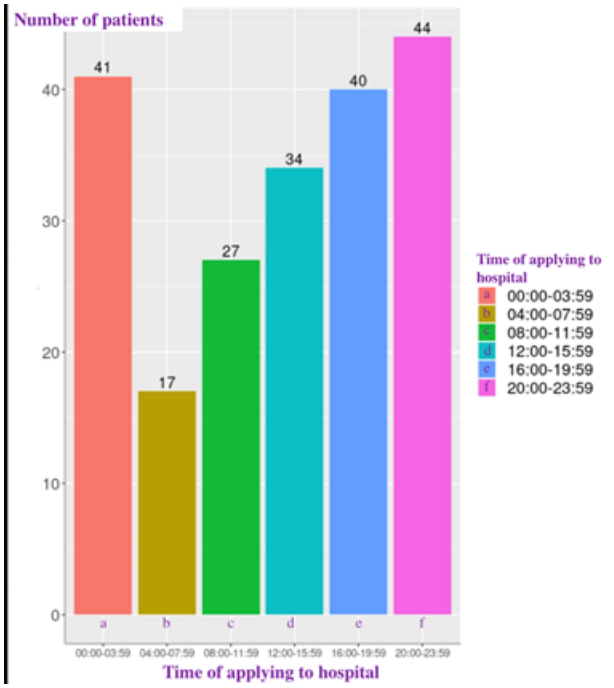

Fig. 1. Time for patients to apply to the Emergency Service after Drug Intoxication

patients were followed up in the psychiatry department, and outpatient clinic follow-up and discharge were recommended to the others. At the time of admission to the ICU, the median (IQR) GCS score was 15 (0), and the mean APACHE II score was 2.16±4.22 (Table 2). The APACHE II score of 107 patients was 0 points, and the GCS of 170 patients was 15 points. There were 96 patients with an APACHE II score greater than 0 points and a maximum of 34 points. There were 33 patients with GCS less than 15 and at least 7 points. It was found that as the GCS score decreased and the APACHE II score increased, the length of stay in the ICUs was prolonged ($p<0.001$) (Table 4).

The complaints of the patients were the most common symptoms regarding the gastrointestinal system, with a rate of 29%, and symptoms regarding the neurological system were found in 16% and the cardiovascular system in 5.9% (Table 2). The mortality rate was "0%" in our study, and we did not have a reported case of death.

Discussion

It has great importance on the prognosis of patients who apply to the emergency department because of drug intoxication and are followed up in the ICU for examinations and treatments to apply to the hospital as soon as possible and to start treatment quickly. The majority of intoxication cases (62.3-91.6%) occur because of drugs (11, 12). Drug intake causes death at a lower rate among suicide methods when compared to other methods (hanging, guns, or cutting tools) (13).

In some studies conducted on cases followed up with acute drug intoxication in the ICU, the mean age and gender distribution of the patients were examined (14). The epidemiological data show that intoxication cases are 70.4% more common in women, usually at a young age (17-40 years); the most common cause is drugs, and they are mostly associated with suicide attempts. The mean age was found to be between 27.4 and 39.7 years (15.16). It was determined that 38% of the patients in the present study were male, and 62% were female. The researchers found that the mean age was 30.83±12.12 years, and 71% of the age range belonged to the 18-35 age group. The rate of female patients was high, and the mean age was found to be 30.22±11.88. These findings significantly reflect the prevalence and gender distribution of young adults in ICU admissions in the present study. Age characteristics and gender distribution show parallelism with the literature data.

Previous studies report that drug intoxication cases are mostly (82.7%-92.2%) for suicidal purposes (17, 18). Similarly, 90% of drug intoxication cases were found to be suicidal in the present study, which presents findings consistent with other studies. It was also found that 34.7% to 47.5% of the patients followed in the ICU because of drug intoxication had a previously diagnosed psychiatric disease (12, 19, 20). It was also found that the most common diseases were anxiety and depressive disorders. In the study, there were 113 (56%) patients diagnosed with depressive disorder. It was seen that being an individual with a history of psychiatric illness was an important risk factor for taking drugs with the intention of suicide. It is very important that people diagnosed with a psychiatric illness are closely followed up against the risk of suicide and that appropriate support is provided. At this point, it is understood, based on the current scientific data of our study, that individuals with a diagnosis of depressive disorder must be primarily targeted in suicide prevention strategies.

Antidepressants and analgesic drugs are commonly seen among drugs that cause intoxication (20). The drugs used most frequently in the treatment of psychiatric diseases rank first, followed by analgesic drugs (21). According to a report published by the AAPCC in 2020, antidepressant exposure increased the fastest compared to other drugs at the rate of 5.84%/year in the last ten years (6). The most common cause of intoxication from medical drugs was reported as 17.5-52.0% antidepressant drugs in previous studies conducted in Turkey (22). In our study, unlike the other studies conducted in our

Table 1: Demographic Data

	n = 203(%)	p
Age	30.83±12.12	
Age by Gender		0.25
male	31.83±12.52	
female	30.22±11.88	
Age groups		
18-20	44 (22%)	
21-25	38 (19%)	
26-30	32 (16%)	
31-35	31 (15%)	
36-40	24 (12%)	
41+	34 (17%)	
Gender		
male	77 (38%)	
female	126 (62%)	

Mean±Standard Deviation; n (%)
Mann-Whitney U Test

country, it was observed that analgesic (46%) drugs were taken most frequently, followed by antidepressants (30%). We think that this difference is because of easier access to analgesic drugs.

In studies conducted on the time zone in which suicide attempts are most frequently committed, it was found that between 18:00-24:00 was determined at a rate of 26.6%-31.8% (23). It was found in the present study that patients were admitted to the emergency department between 20.00 and 23.59 hours because of a suicide attempt. It was reported in previous studies that the rate of admission within two hours after taking the drug was 39.3-58.3% (24). It was found in our study that 70.4% of the cases applied to the emergency department within the first two hours after taking the drug. The mortality rate, which varies between 0.6 and 9.1% in the literature, was "0" in the present study (10, 25, 26). This shows that admission to the emergency department is usually rapid, and patients strive for early access to emergency medical attention in cases of drug intoxication. In this way, early intervention was provided to the patients, and we think that this played an important role in the fact that there was no mortality.

The clinical course of drug intoxication cases may vary depending on the type and dose of the agent taken, which may affect the length of stay in the ICUs. The length of stay in the ICUs was reported to be 2.5-3.89 days in previous studies, and it was determined in a study that 12% of the patients continued to need the ICUs for more than 48 hours (19, 20, 27, 28). In this study, it was found that only 6.9% of the patients continued to stay in the ICU after 48 hours. Transfer, referral, and discharge status of drug intoxication cases whose intensive care treatment was completed were investigated in different studies. In a previous study conducted in Australia, 74% of the patients were discharged, and 18% continued their treatment in the psychiatry ward (18). In a study that was conducted in the United Kingdom, 12% of cases were discharged, and 10% were referred to psychiatric units (28). In our study, 76.3% of the patients followed in the ICU were discharged directly, and 23.7% were hospitalized in the wards for follow-up and continuation of their treatments.

In a study that examined the risk factors affecting the mortality of patients followed up in the ICU due to intoxication, the mortality rate was reported to be 1.5%, the mean GCS of the patients was 9.7, and the APACHE II score was 27.4 (29). It was found in another study that the GCS measured at the first admission to the ICU was significantly lower in cases with mortality, and the APACHE II scores were found to be elevated (30). Only one of the 107 patients with an APACHE II score of "0", for whom a positive correlation was detected between the APACHE score and the prolongation of ICU stay, was followed in the ICU for more than 48 hours in the present study. During the follow-up of these patients, there was no need to perform any procedure that would require intensive care. The GCS system is effective in determining mortality rates in intoxication.

Table 2: Drug Groups, Characteristics and Effects on Patients

	n = 203(%)
Drug Groups	
Analgesics	94 (46%)
antidepressant	59 (29%)
antihypertensive	6 (3.0%)
antibiotic	19 (9.4%)
antiepileptic	12 (5.9%)
antidiabetic	2 (1.0%)
proton pump inhibitors	4 (2.0%)
anticoagulant+ antiaggregant	1 (0.5%)
thyroid	1 (0.5%)
antipsychotic	2 (1.0%)
amphetamine	3 (1.5%)
Number of drugs	22.74±12.22
Cause of Intoxication Cases	
suicidal	183 (90%)
accidentally	20 (9.9%)
Depressive disorder	
yes	113 (56%)
	M:48 W:65
no	90 (44%)
Emergency service admission symptoms	
no	98 (48%)
Gastrointestinal symptoms	59 (29%)
Cardiovascular symptoms	12 (5.9%)
Neurological symptoms	33 (16%)
Renal symptoms	1 (0.5%)
APACHE II score	2.16±4.22
GCS	15 (0)
Length of stay in the ICU	2(1)

Mean±Standard Deviation; n (%); Median (IQR)
APACHE II: Acute Physiology and Chronic Health Evaluation; GCS: Glasgow Coma Scale; ICU: Intensive Care Unit

cases followed in ICU, and it has been shown to be valuable with the advantage of being able to be evaluated immediately when faced with the patient without the need for physiological parameters. In a study on patients hospitalized in the ICU because of intoxication, it was found that if patients with GCS 15 were followed up inwards, unnecessary bed occupation would be prevented, and the cost would be lower (26). A negative and significant correlation was detected in the present study between GCS and prolongation of ICU stay, and 165 of 170 patients with GCS 15 were discharged from the ICU within 48 hours. There was no need for mechanical ventilation or inotropic vasopressor support, or any organ dysfunction that would require the follow-up of patients in tertiary ICU. Patients were monitored regarding non-invasive arterial blood pressure, peripheral oxygen saturation, and electrocardiogram monitoring, and some patients were given nasal or mask oxygen therapy. A low GCS and a high APACHE II score at admission help predict longer ICU stays and can be used to predict morbidity and mortality.

The day of bed occupation of the patients who were discharged directly from the ICU without any complications was found to be 224 days. Hospitalization of patients who appear healthy or have mild symptoms causes unnecessary bed occupancy, and the hospital loses money in terms of costs because it is billed as a primary care intensive

Table 3: Demographic Characteristics of Suicide or Accidental Drug Intoxication Groups

	suicide, N = 183	accidental, N = 20	p
Age	30.34±11.40	35.30±17.17	0.349
Gender			0.781
male	70 (38%)	7 (35%)	
female	113 (62%)	13 (65%)	
Number of drugs	23.84±12.06	12.65±8.72	<0.001

Mean±Standard Deviation; n (%)
Mann-Whitney U Test; Pearson's Chi-squared test

Table 4: Correlation Between GCS and APACHE II Scores and Length of Stay in Intensive Care Unit

		Length of Stay in ICU
APACHE II score	Rho	0.315
	p	<0.001
GCS	Rho	-0.238
	p	<0.001

Spearman's correlation
APACHE II**:** Acute Physiology and Chronic Health Evaluation; GCS: Glasgow Coma Scale; ICU: Intensive Care Unit

care follow-up despite being followed up in a tertiary ICU. It also prevents the admission of other patients who need 3rd step ICU to these beds, which are occupied unnecessarily. The 114 Poison Counseling Centers recommend intensive care follow-up for most patients; the anxiety of being a forensic event and the inconsistency of the patients' anamnesis are important factors in the follow-up of patients whose general condition can be followed up inwards in the ICUs.

The present study had some limitations. Firstly, because it was limited to one centre, the results we found may not apply to other ICUs with distinct patient socioeconomic and cultural profiles. Secondly, no information was recorded on the patients' long-term results following their discharge from the hospital and ICU.

In conclusion, it is considerable that drug intoxication cases in ICU mostly occur with toxic doses of easily accessible medical drugs for suicidal purposes, and most of the patients have a history of psychiatric illness. It is anticipated that it would be more appropriate to follow up with patients who do not have intensive care admission indications, have a low APACHE II score, and have a GCS of 15 in an emergency department or ward environment for the present study. We think that these findings emphasize the importance of applying supportive treatments to reduce the risk of suicide and their great impact on ICU capacity.

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