

Retrospective evaluation of the acute drug poisoning cases admitted to the emergency department of a tertiary care hospital

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Abstract

Objectives: Poisoning is a significant global health concern, leading to higher mortality and morbidity rates. The present study aimed to assess demographic details, hospital admission patterns, laboratory findings, and applied pharmacological treatments for patients presenting to the Emergency Department with drug poisoning.

Materials and Methods: From August 5, 2020, to August 5, 2021, a cross-sectional, retrospective analysis was conducted on patients who presented to the Emergency Department of a tertiary care hospital with a drug poisoning diagnosis. Information gathered included patient demographics, the identified poisoning agent, laboratory findings, and the implemented treatment strategies.

Results: The mean age for the 584 drug poisoning cases was 30.0 ± 10.9 years; the majority, 44.9%, were between 18-25 years old, with a female preponderance (63.0%). The most frequently implicated drug groups were anti-inflammatory/anti-rheumatic products and psychoanaleptics, each accounting for 13.7% of all identified drugs.

Conclusion: These findings suggest the need for improved awareness, monitoring, and rational use of commonly accessible medications. Strengthening regulations on over-the-counter drug availability may also help reduce poisoning incidents.

Keywords: drug poisoning, emergency department, paracetamol

Introduction

Drug poisoning represents a significant global public health concern, characterized by higher rates of mortality and morbidity. Drug poisoning frequently arises from the administration of elevated dosages of prescription or non-prescription medications to patients and/or their relations, incidental contact with chemical compounds, or intentional intake of biological agents for suicidal purposes [1-3]. Developed countries observe an annual drug poisoning incidence of 0.02% to 0.93%, with increasing this rate worldwide [4].

Despite regional, sociocultural, and economic variations in the causes of drug poisoning, pharmaceutical agents are consistently identified as the predominant factor, accounting for 47-86% of cases [2]. A significant number of emergency department (ED) visits are attributed to widely accessible and frequently used medications.

High mortality and morbidity rates, as well as escalating healthcare costs, are direct consequences of drug poisoning [5]. Besides drug overdose-related mortalities, consequential health issues like cardiac disorders, cognitive impairment, aspiration pneumonia,

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musculoskeletal system problems, renal dysfunction and hypoxic brain damage are also observable during drug poisoning [6].

Drug poisoning patterns vary across regions, largely reflecting differences in drug accessibility and prescribing practices [5]. Reports from various international studies consistently identify analgesics and nonsteroidal anti-inflammatory drugs in Saudi Arabia [7], opioids and pesticides in Iran [8], sedative/hypnotic drugs in China [9], and antidepressants and analgesics in Türkiye [10] as the most frequent causes of drug poisoning.

The study aimed to assess the demographic profiles, hospital admission data, laboratory results, and pharmacological interventions used in patients diagnosed with drug poisoning who were treated at the Konya City Hospital ED. Epidemiological research is critically important for the prevention of drug poisoning incidents, the formulation of therapeutic strategies, and the dissemination of current drug poisoning-related data. From this perspective, our study is expected to be a noteworthy addition to the current literature, offering valuable direction for appropriate safety measures and management practices. Unlike previous studies conducted in Türkiye, this study provides a comprehensive evaluation of drug poisoning patterns by integrating ATC-based drug classification, detailed laboratory findings, and treatment modalities within a large tertiary emergency department cohort. This approach allows for a more structured assessment of drug poisoning profiles and may offer additional insights into regional prescribing patterns and clinical management strategies.

Materials and Methods

From August 5, 2020, to August 5, 2021, a cross-sectional, retrospective analysis was conducted on the data of patients diagnosed with drug poisoning at Konya City Hospital's Emergency Medicine Clinic. Drug poisoning was defined based on clinical evaluation supported by patient history, physician diagnosis recorded in hospital records, and, when available, toxicological or laboratory findings. Following approval from the Necmettin Erbakan University ethics committee (IRB No: 2022/3602, January 2022), the researchers retrospectively reviewed patient files. Given

the retrospective design, the requirement for informed consent was waived.

Patients 18 years or older diagnosed with drug poisoning at the Konya City Hospital Emergency Medicine Clinic during the specified date interval were included in the present study. The study included all cases of drug poisoning regardless of intent; however, due to the retrospective design, differentiation between intentional (suicidal) and accidental drug poisoning could not be consistently determined. Data encompassing participant demographics (age, sex, citizenship, marital status), admission details (application date and time, mode of arrival), treatment information (total drugs administered, drug nomenclature and Anatomical Therapeutic Chemical [ATC] codes), co-occurring substance use (alcohol intake), and hospitalization parameters (duration and type), were systematically collected. The patient's laboratory results, encompassing MCV, glucose, BUN, creatinine, sodium, chlorine, potassium, AST, ALT, GGT, LDH, lactate, blood gas parameters, and ethanol level, were documented. Details of the patient's treatments, focusing on the pharmacological interventions and the names of the drugs used, were recorded. Gastric lavage and/or activated charcoal were provided based on clinical indications.

Descriptive statistics were expressed as mean $\pm$ standard deviation for continuous variables and as frequency (n, %) for categorical variables. The normality of distribution was assessed using the Kolmogorov-Smirnov test. Independent samples t-tests were used for continuous variables, whereas Pearson's chi-square test was applied for categorical variables.

Univariable logistic regression analyses were additionally performed to evaluate whether age and sex were associated with multiple drug ingestion and hospitalization. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated.

A p-value <0.05 was considered statistically significant.

Results

Demographic characteristics of patients

A comprehensive review of the Emergency Medicine Clinic at Konya City Hospital revealed 299,572 patients

admitted to the ED during the period from August 5, 2020, to August 5, 2021. Within this group, 584 charts (0.2%) of patients diagnosed with drug poisoning upon admission underwent retrospective evaluation. The patient group exhibited a mean age of 30.0 ± 10.9 years, with a significant portion (44.9%) aged between 18 and 25, with a female preponderance (63.0%) (Table 1). A significant 94.3% of the patients were identified as Turkish citizens and most of the individuals were married (48.8%) (Table 1). Sex-stratified analyses demonstrated that females were more likely to present by self-admission, whereas males more frequently arrived by ambulance (23.5% vs. 15.7%, $p=0.033$). In addition, female patients showed higher frequencies of anti-infective and muscle relaxant-related poisonings,

whereas psycholeptic-related poisonings were more common among males (Supplementary Table 1).

Hospital admission characteristics of the patients

Admissions for drug poisoning surged on weekend nights, from Friday evening to Monday morning, accounting for 38.2% of cases, and also during the nightly hours of 8 PM to 8 AM, representing 32.4%. The vast majority of these patients, 78.8%, arrived via ambulance at the ED. Across age groups, mode of arrival did not significantly differ, although ambulance use tended to increase among older adults (Supplementary Table 2). Drug poisoning reports peaked in May, accounting for 10.6% of cases. Spring months saw the highest incidence at 27.2%, while winter months registered the lowest at 20.0% (Figure 1).

Table 1. Patients' demographic and hospital admission characteristics (n=584)

Variables	n (%) Mean $\pm$ SD
Gender	
Female	368 (63.0%)
Male	216 (37.0%)
Age groups (in years)	
18-25	262 (44.9%)
26-44	255 (43.7%)
45-64	64 (11.0%)
≥ 65	3 (0.5%)
Age	30.0 $\pm$ 10.9
Citizenship	
Turkish	551 (94.3%)
Syrian	31 (5.3%)
Other citizenships	2 (0.3%)
Marital Status	
Married	285 (48.8%)
Single	240 (41.1%)
Separated/Divorced	59 (10.1%)
Time of presentation	
Daytime arrival (08:00-20:00 h)	172 (29.5%)
Night arrival (20:00-08:00 h)	189 (32.4%)
Weekend arrival (Friday 17:00- Monday 08:00 h)	223 (38.2%)
Way of arrival	
Ambulance	460 (78.8%)
Self admission	124 (21.2%)

Evaluation of the drugs received by the patients and the hospitalization status

Of the cases, 43.5% (n=254) indicated the use of one drug, while 42.5% (n=248) reported using two or more, with a high of 10 drugs being documented. The proportion of single versus multiple drug ingestion did not significantly differ according to sex or age group (Supplementary Tables 1 and 2). Similarly, the frequency of self-reported ethanol co-ingestion did not differ significantly according to sex or age group (data not shown). In 14% of the cases (n=82), participants were unable to report their drug consumption. As detailed in Table 2, forty-five patients (7.7%) also indicated concurrent use of ethanol with their medications. The findings indicate that a significant majority of patients were released from the ED within a 24-hour period, accounting for 73.1%. A single patient died out of 584, representing a 0.2% mortality rate (Table 2). Outcome distributions differed significantly across age groups ($p<0.001$), with older patients showing higher rates of referral to other institutions and hospitalization outside the emergency department (Supplementary Table 2). Table 2 illustrates that 10.6% of hospitalized patients had a stay of one day, whereas the proportion of those hospitalized for five days or more was significantly smaller at 1.5%.

Analysis of the top 10 ATC-1, ATC-2 and ATC-5 distributions of drugs received by the patients

A total of 1,013 drugs involved in drug poisoning events were analyzed. Among these, drugs classified under

the “Nervous System” category (ATC-1 code: N) were the most common, accounting for 41.1% of all cases. Regarding the ATC-2 group assessment, the most frequently implicated drug categories were “Anti-inflammatory and anti-rheumatic products” (ATC-2 code M01) and “Psychoanaleptics” (N06), each accounting for 13.7% of the total. According to the ATC-5 classification, paracetamol (N02BE01) accounted for 7.3% of all cases, followed by ibuprofen + pseudoephedrine HCl (M01AE51) and dexketoprofen (M01AE17), which accounted for 3.9% and 3.8%, respectively; these were the three most frequently implicated drugs in drug poisoning (Table 3). Age-stratified analyses revealed significant differences in several ATC categories. Poisonings involving alimentary tract and metabolism drugs, cardiovascular drugs, musculoskeletal system drugs, and antiepileptics varied across age groups (Supplementary Table 2). Furthermore, psycholeptic poisonings were significantly more frequent among males, whereas antibacterial and muscle relaxant-related poisonings were more common among females (Supplementary Table 1).

Evaluation of the laboratory parameters of the patients

Ethanol levels in the blood were determined by 258 individuals (44.1%) experiencing drug poisoning. The findings indicated that 214 patients (36.6%) had concentrations within the normal range (0-10 mg/dL), whereas 44 patients (7.5%) demonstrated elevated levels (>10 mg/dL). Our subsequent analysis of 44 patients presenting with high blood ethanol concentrations indicated a mean blood ethanol level of 143.5 ± 108.9 mg/dL, with the lowest observed level at 14 mg/dL and the highest at 463 mg/dL. The blood parameters analyzed, such as MCV, glucose, sodium, chlorine, potassium, BUN, AST, ALT, GGT, LDH, lactate, and blood gas pH and bicarbonate, showed no statistically significant differences between patient groups who ingested a single drug versus multiple drugs. Creatinine was the only parameter that differed significantly ($p=0.024$) (Table 4). The lack of significant differences in most laboratory parameters suggests that these markers may have limited utility in distinguishing between single and multiple drug ingestion in the acute setting. Sex-based analyses demonstrated higher creatinine, AST, ALT, and lactate levels among male

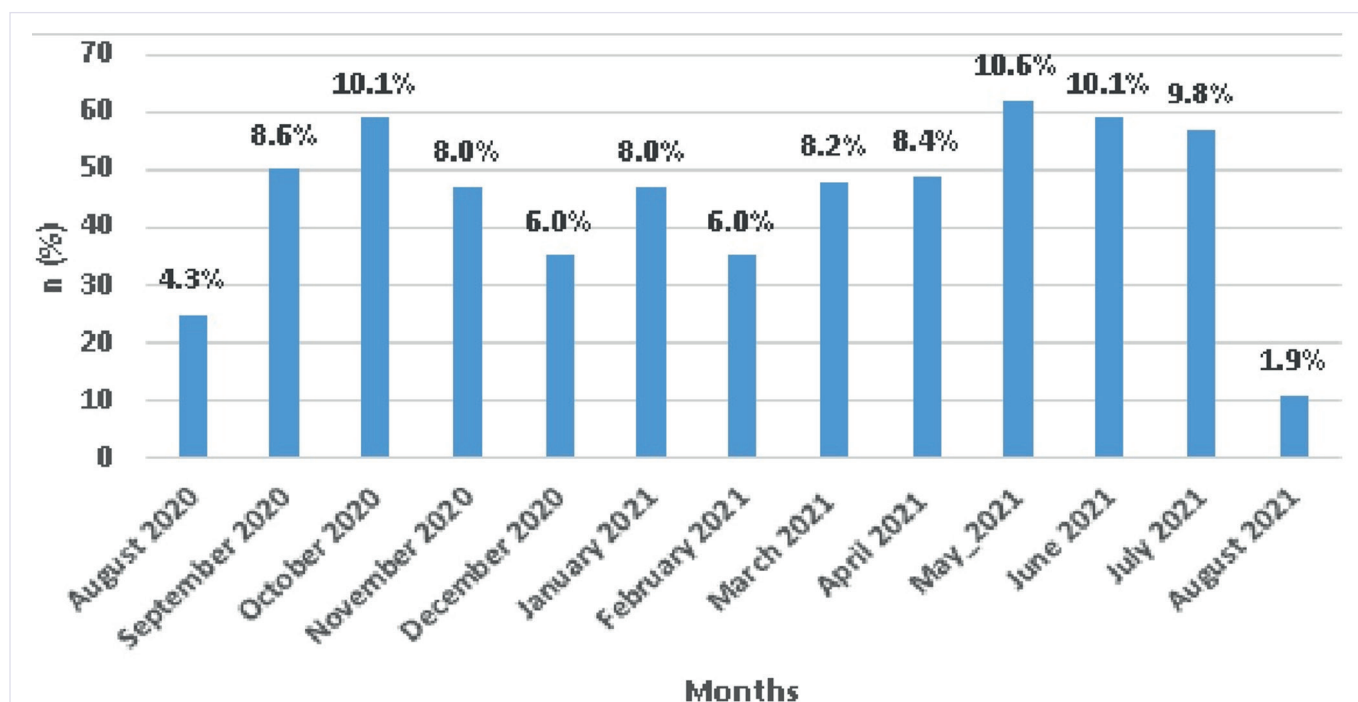


Figure 1. Distribution of drug poisoning admissions by months

** It only shows the distribution of patients who developed drug toxicity. Admissions without drug poisoning were not included in the graph.

Table 2. Medication intake, associated factors and hospitalization duration

Variables	n (%)
The number of drugs received	
Not identified	82 (14.0%)
1 drug	254 (43.5%)
2 or more drugs	248 (42.5%)
Ethanol co-ingestion (self-report)	
Yes	45 (7.7%)
No	469 (80.3%)
Not known	70 (12.0%)
Outcome	
Discharge from the ED	427 (73.1%)
Hospitalization in the ICU	139 (23.8%)
Hospitalization in another department	9 (1.5%)
Referral to another institution	8 (1.4%)
Ex	1 (0.2%)
Hospital staying time	
Not known	8 (1.4%)
Less than 24 hours	427 (73.1%)
1 day	62 (10.6%)
2 days	19 (3.3%)
3 days	32 (5.5%)
4 days	27 (4.6%)
5 days or more	9 (1.5%)

patients compared with females (all $p < 0.01$). In contrast, age-group analyses showed significant differences only for creatinine and lactate levels (Supplementary Tables 1 and 2).

Assessment of the treatment modalities and pharmacologic agents applied to the patients in the ED

The primary interventions for acute drug poisoning involved the administration of 0.9% physiological saline solution (20.7%), activated charcoal (17.7%), and gastric lavage (17.6%). Regarding the administration of pharmacological agents, 48 patients (8.2%) did not require any drug therapy, while the majority of patients (72.3%) needed two or more pharmacological

interventions. Pharmacologic interventions frequently employed encompass gastro-protective agents, antiemetics, spasmolytics, and anticholinergics, as indicated in Table 5. Interventions such as gastric lavage and activated charcoal were applied according to standard toxicological management protocols, primarily depending on the time since ingestion and the clinical condition of the patient. No major age- or sex-related differences were observed in the application of gastric lavage, activated charcoal, or N-acetylcysteine therapy (data not shown).

Logistic regression

Univariable logistic regression analyses showed that neither age nor female sex was significantly associated with multiple drug ingestion or the need for hospitalization. Neither increasing age nor female sex was associated with a higher likelihood of multiple drug ingestion or hospitalization. These findings suggest that demographic factors alone may not adequately explain poisoning severity or clinical outcomes in this cohort (Table 6).

Discussion

Drug poisoning represents a significant public health concern, contributing substantially to ED admissions and requiring effective early clinical management. This current study involved a comprehensive examination of data from patients admitted to the ED with drug poisoning. Our findings indicate that drug poisoning incidents represented 0.2% of all ED admissions during the study period. ED admissions for drug poisoning cases represented a varying proportion, from 0.12% to 0.71% in Türkiye [11-13].

Our study observed a higher proportion of female participants, with 63.0% identifying as female compared to males. Interestingly, although females constituted the majority of poisoning cases, sex-stratified analyses revealed differences in poisoning profiles rather than overall severity. Females were more frequently exposed to antibacterial agents and muscle relaxants, whereas psycholeptic poisonings were more common among males. These findings may reflect sex-specific medication utilization patterns in the community. The finding mirrored previous studies, which had also suggested that females were more prone to drug poisoning than males [5,7,9-11,14,15]. This

Table 3. Top 10 ATC-1, ATC-2 and ATC-5 distributions of the drugs received by the patients (n=1013)

Variables	Frequency (%)
ATC-1 Codes	
Nervous System (N)	416 (41.1%)
Musculoskeletal System (M)	166 (16.4%)
Alimentary Tract and Metabolism (A)	124 (12.2%)
Respiratory system (R)	96 (9.5%)
General Anti-infectives for Systemic Use (J)	70 (6.9%)
Cardiovascular System (C)	48 (4.7%)
Antiparasitic Products (P)	38 (3.8%)
Blood and Blood Forming Organs (B)	22 (2.2%)
Genitourinary System and Sex Hormones (G)	17 (1.7%)
Systemic Hormonal Prep. excluding Sex Hormones (H)	10 (1.0%)
ATC-2 Codes	
Anti-inflammatory and Antirheumatic Products (M01)	139 (13.7%)
Psychoanaleptics (N06)	139 (13.7%)
Analgesics (N02)	111 (11.0%)
Psycholeptics (N05)	105 (10.4%)
Antibacterials for Systemic Use (J01)	65 (6.4%)
Antiepileptics (N03)	44 (4.3%)
Cough and Cold Preparations (R05)	44 (4.3%)
Drugs for Acid Related Disorders (A02)	42 (4.1%)
Drugs for Functional Gastrointestinal Disorders (A03)	30 (3.0%)
Muscle Relaxants (M03)	25 (2.5%)
Drug Names (ATC-5 Codes)	
Paracetamol (N02BE01)	74 (7.3%)
Ibuprofen +pseudoephedrine HCL (M01AE51)	40 (3.9%)
Dexketoprofen (M01AE17)	39 (3.8%)
Sertraline (N06AB06)	36 (3.6%)
Paracetamol +pseudoephedrine HCL+ Chlorpheniramine (R05X)	32 (3.2%)
Amoxicillin-clavulanic acid (J01CR02)	26 (2.5%)
Quetiapine (N05AH04)	25 (2.5%)
Diclofenac potassium (M01AB05)	22 (2.2%)
Pantoprazole (A02BC02)	19 (1.9%)
Escitalopram (N06AB10)	18 (1.8%)

ATC: Anatomical Therapeutic Chemical

finding is consistent with previous studies; however, the underlying reasons could not be determined within the scope of this study. Furthermore, the present

study observed that drug poisoning disproportionately affected young adults aged 18-25, a finding consistent with existing national and international research that

Table 4. Comparison of laboratory parameters of the patients based on single or multiple drug use

Laboratory Parameter	Single drug intake (n=254)	Multiple drug intake (n=248)	p value
MCV	86.41± 6.74	86.14± 5.90	0.628
Glucose	105.36± 25.96	103.92± 29.21	0.563
BUN	10.32 ± 3.55	11.09 ± 4.69	0.149
Creatinine	0.73 ± 0.22	0.78 ± 0.54	0.024
Na	139.12± 3.96	139.52± 2.61	0.182
K	4.20± 0.48	4.17± 0.46	0.532
Cl	103.99±3.07	104.48±3.10	0.094
AST	22.80± 14.62	20.84± 10.18	0.086
ALT	19.04± 13.69	18.38± 12.34	0.573
GGT	17.91± 14.52	17.54± 11.11	0.760
LDH	246.33± 99.86	235.91± 77.11	0.250
Lactate	1.95± 1.10	1.90± 1.41	0.698
Blood gas pH	7.38± 0.04	7.37± 0.05	0.551
Blood gas bicarbonate	23.63±1.87	23.50± 2.27	0.513

MCV: Mean Corpuscular Volume, AST: Aspartate Aminotransferase, ALT: Alanine Aminotransferase, GGT: Gamma-glutamyl Transferase, LDH: Lactate dehydrogenase

*Independent t test

highlights elevated rates within this demographic [13,16-19]. Additional age-stratified analyses demonstrated that the distribution of implicated drug classes differed across age categories. Younger adults were more frequently exposed to alimentary tract and metabolism agents, whereas cardiovascular and antiepileptic drug poisonings were relatively more common among older age groups. Such differences may be related to age-dependent prescribing patterns and underlying comorbidities. The higher frequency of cardiovascular drug poisonings among older adults likely reflects the greater burden of chronic cardiovascular disease in this population, whereas poisonings involving alimentary tract and metabolism drugs were predominantly observed in younger adults. In line with previous studies conducted in Türkiye and India [20-22], the current study reported a higher prevalence of drug poisoning among married individuals.

A seasonal analysis of drug poisoning admissions showed that the highest proportion of cases (27.2%) occurred during the spring. Consistent with previous investigations, this finding indicated that drug poisoning admissions were most frequent during the spring months [13,23,24]. Additionally, the study by Coimbra et al. [25] indicated a notable increase

in reported suicides during the spring months. This seasonal variation has been suggested in previous studies; however, the underlying mechanisms remain unclear and may involve behavioral, environmental, and psychosocial factors. Furthermore, the findings of Orsini et al. [6] indicated that the majority of admissions occurred on weekends, accounting for 38.2%.

In line with the findings of Ergun et al. [12] and Shokrzadeh et al. [18], the study observed a higher incidence of drug poisoning cases attributed to a single drug. In contrast, Varisli et al. revealed that drug poisoning most often related to ingestion of multiple drugs [15].

The discharge rate from the ED was 73.1%, consistent with previous research by Sacak et al. and Baykan et al. [1,[xRef]1[/xRef]1]. Considering that late intervention in drug poisoning incidents correlates with an increase in morbidity and mortality, timely diagnosis and treatment are paramount to sustaining individuals' vital functions and decreasing the incidence of mortality. The current study reported a drug poisoning mortality rate of 0.2%. The studies by Varisli et al. [15] and Yagan et al. [26] reported the mortality rate at 0.8% and 0.31% respectively.

Different agents have been linked to drug poisoning globally. Our investigation revealed that the leading drug groups, consistent with earlier research in Türkiye [10,12,17,20,27], comprised anti-inflammatory and anti-rheumatic products (13.7%), psychoanaleptics (13.7%), and analgesics (11.0%).

Regarding pharmaceutical nomenclature, paracetamol was identified as the most frequently occurring agent in drug poisoning incidents, accounting for 7.3%.

Table 5. Top 10 treatment modalities and number of the pharmacologic agents applied to the patients in the emergency department

Variables	Frequency (%)
Top 10 treatment modalities (n=1753)	
0.9% Physiological saline solution	363 (20.7%)
Activated charcoal	310 (17.7%)
Gastric lavage	309 (17.6%)
%5 Dextrose	222 (12.7%)
Pantoprazole	134 (7.6%)
Metoclopramide	60 (3.4%)
N-Acetylcysteine	52 (3.0%)
Ranitidine	52 (3.0%)
Hyoscine N-butyl bromide + Paracetamol	24 (1.4%)
Ondansetron	24 (1.4%)
Biperidene	15 (0.9%)
Number of the pharmacologic agents used (n=1459)	
No drug	48 (8.2%)
One drug	114 (19.5%)
2 drugs	151 (25.9%)
3 drugs	131 (22.4%)
4 drugs	87 (14.9%)
5 or more drugs	53 (9.1%)

Further findings by Cakmak et al. [20] and Sungur et al. [28] identified paracetamol as the primary agent in drug poisoning cases in Türkiye. The commonality of paracetamol in drug poisoning cases stems from its low cost and ease of access.

Alcohol consumption is frequently observed alongside drug poisoning incidents. The accompanying alcohol use frequency identified in our research was 7.5%. We also observed higher creatinine, AST, ALT, and lactate levels among male patients. Although these differences were statistically significant, their clinical relevance remains uncertain given the generally modest absolute differences and the retrospective nature of the study. A study originating from Türkiye indicated that the frequency of concomitant alcohol consumption was 15.7 [28], whereas research in Taiwan revealed a significantly higher prevalence of ethanol use at 62.4% [29].

Logistic regression analyses did not identify age or sex as significant predictors of multiple drug ingestion or hospitalization. This finding suggests that demographic characteristics alone may be insufficient to explain clinical severity and that other factors, such as the type and dose of the ingested drug, psychiatric comorbidities, or time to presentation, may play a more important role. This observation is consistent with the descriptive subgroup analyses, which demonstrated differences in poisoning profiles rather than differences in overall clinical outcomes.

Study Limitations

This study has several limitations. First, its retrospective and single-center design limits the generalizability of the findings. Second, the inability to distinguish between intentional and accidental drug poisoning restricts the interpretation of underlying causes. Third, data regarding patients' educational status and socioeconomic background were not available, which may represent important contributing factors. Additionally, information on illicit or recreational drug use

Table 6. Univariable logistic regression analyses for multiple drug ingestion and need for hospitalization

Predictor	Multiple Drug Ingestion OR (95% CI)	p	Need for Hospitalization OR (95% CI)	p
Age, per year	1.00 (0.98–1.01)	0.570	1.01 (0.99–1.02)	0.239
Female sex	1.19 (0.85–1.68)	0.310	1.10 (0.77–1.58)	0.605

Abbreviations: OR, odds ratio; CI, confidence interval.

was not systematically recorded. Moreover, subgroup analyses—such as comparisons between hospitalized and discharged patients or identification of predictors of ICU admission—were not performed, limiting the ability to identify independent risk factors. In addition, age- and sex-specific differences in hospital length of stay could not be comprehensively evaluated because of the limited granularity of retrospective hospital records. Future studies incorporating multivariable statistical models are needed to better determine predictors of clinical outcomes in drug poisoning cases.

Conclusion

Drug poisoning was more frequently observed among females, young adults, and married individuals in this cohort. The most commonly implicated drug groups were anti-inflammatory, anti-rheumatic, psychoanaleptic, and analgesic agents. These findings highlight the importance of improving awareness and monitoring of commonly used medications. In addition, strengthening regulations on over-the-counter drug availability and promoting rational drug use may help reduce the burden of drug poisoning. Further studies incorporating more detailed clinical and behavioral data are needed to better inform targeted prevention strategies.

Author contributions

Conception and design: N.K.K., E.N.Ö.; Data acquisition: N.K.K., E.N.Ö.; Data analysis: N.K.K., E.N.Ö.; Data interpretation: N.K.K., E.N.Ö.; Drafting of the manuscript: N.K.K., E.N.Ö.; Critical revision of the manuscript: N.K.K., E.N.Ö. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Necmettin Erbakan University (Date: January 1, 2022, Decision/Protocol No: 2022/3602). Informed consent was not required for this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

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