

Hospital-based analysis of drug poisoning cases: Trends and risk factors



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Abstract

Objective: The epidemiology of drug poisoning is an essential field of study in public health research that explores the many aspects of this urgent problem. Accidental poisoning is the third most common cause of death and the fifth most common reason for hospital visits in several developing countries. Pharmaceutical poisoning is the second most common cause of hospital admissions and deaths in Iran, where unintentional poisoning remains a serious health concern. This research aims to thoroughly investigate all aspects of drug poisoning cases using epidemiological analysis.

Methods: This study analyzed the records of 701 consecutive patients at Shiraz Faghihi hospital Medical Emergency Center in Iran between April 1 and September 30, 2022. Poisoning diagnosis was determined based on reports and documents. Data were collected from patient medical records and analyzed using SPSS software, with a significance level set at $P < 0.05$. The chi-square test was used to compare the means of drug-posing variables and demographic variables.

Results: This study reviewed 701 cases, with an average age of 35.02 ± 16.104 ($P < 0.001$), 45.8% of whom had education levels higher than high school ($P = 0.012$). The majority (66.6%) had no psychiatric history ($P < 0.001$), and 55.6% had no history of addiction ($P < 0.001$). The predominant poisoning agent was opium (48.9%), followed by benzodiazepine poisoning (40.2%). About 10% were attributed to other causes. A mortality rate of 3.4% was observed, and 96.6% of the cases survived.

Conclusion: The study underscores the crucial importance of addressing drug usage for both prevention and therapy. Additionally, the revelation that medicines often serve as the primary source of toxicity, particularly in developing countries, emphasizes the high accessibility and potential hazards associated with these medications.

Keywords: Analgesics, Opioid, Benzodiazepines, Hospitals, Developing countries, Drug poisoning, Iran

Introduction

A crucial area of study in the field of public health research is the epidemiological study of drug poisoning, which attempts to explore the complex aspects of this urgent problem. Drug poisoning episodes affect individuals, neighbourhoods, and healthcare systems worldwide, making them a significant concern. When a person intentionally or unintentionally ingests hazardous chemicals or medications, the resultant state is known as poisoning. One of the most common forms of poisoning that a person can inadvertently cause is unintentional poisoning, which can occur through a variety of means, including misuse, overdosing, accidents, and occupational exposure (1,2).

Global statistics indicate a marked rise in accidental poisonings. It is one of the frequent medical situations that results in mortality (1). In certain undeveloped nations, poisoning ranks third in terms of causes of mortality and fifth in terms of hospital visits (3). Every year, numerous individuals are brought into emergency rooms as a result of different kinds of poisoning. Many of these

individuals, according to reports, cannot be rescued (4). The World Health Organization's most recent data state that accidental poisoning results in 346 000 deaths, with low-income nations accounting for 91% of these deaths. The toll that accidental poisoning has had on human life expectancy exceeds 10.7 million years (5).

Generally speaking, drug poisoning is widespread in several Iranian areas (6,7). In Iran, accidental poisoning is a serious health concern, with medication poisoning ranking as the second most common cause of hospital admissions and fatalities. The most frequent cause of poisoning deaths is opium, and the most prevalent reason for emergency room visits is abuse-related tramadol poisoning (8). Following alcohol, opium, hashish, and tramadol, Ritalin misuse comes in at number five. Poisonous plants caused 0.97% of poisoning incidents in the city of Sari (Iran). Spider poisoning and scorpion bites are two serious health problems in the south and southwest of Iran. According to studies, the most frequent cause of poisoning-related deaths is opium (7,9).

Several variables influence a nation's poisoning



pattern, such as the availability of different poisons, the geographic and meteorological circumstances, and the populace's social, cultural, and religious views. Understanding the pattern of poisoning is essential for determining risk factors, diagnosing poisoning early, and developing preventative measures against unintentional poisonings (1).

Despite the existing body of research, critical gaps remain in understanding the epidemiological patterns of drug poisoning. Many studies focus on specific substances without exploring broader poisoning trends or their evolving nature due to changes in drug availability, social behaviors, and regulatory measures.

To our knowledge, there is a lack of epidemiological studies about common causes of unintentional poisoning in adults in Shiraz. This study aimed to investigate all aspects of drug poisoning cases using epidemiology research to understand the most common causes. Collecting epidemiological data about the patients can help with the adequate care of those referred to the emergency room and the preparations needed to prevent poisoning (10). Thus, the purpose of the current study was to conduct research into the different kinds of drug poisoning that patients who were referred to the emergency center at Faghihi hospital in Shiraz in the six months of 2022 experienced. Thus, the objective of this study was to analyze the epidemiological patterns, causes, and outcomes of drug poisoning cases among patients admitted to the emergency department at Faghihi hospital in Shiraz over six months in 2022 to inform preventive strategies and improve patient care.

Methods

This is a case series study. It considered the records of patients referred to Shiraz Faghihi Hospital Medical Emergency Center (Iran) between April 1 and September 30, 2022. The sample size was 701 patients, and the consecutive sampling method was used. The ethics committee of Shiraz University of Medical Sciences (Iran) approved this study, with the code of ethics IR.SUMS.MED.REC.1402.186.

The medical records served as the criterion for the poisoning diagnosis. The diagnosis was made based on the patient's statement, the statements of the witnesses, the smell of poisoning agents, symptoms and signs compatible with poisoning, and blood tests.

All patients who fulfilled the study's inclusion criteria at admission and were diagnosed with poisoning were included. Exclusion criteria encompassed patients whose deaths resulted from reasons other than poisoning, files lacking the final diagnosis, and medical records with incomplete information.

The samples were collected by reviewing the files of poisoned patients in the center's archive center. The cause of the poisoning, the outcome (discharge, in-hospital

mortality), and demographic data (age, education, psychiatric history, and addiction history) were all gathered based on the information sheets that were prepared by the researchers for this study.

SPSS (version 21) software was utilized for data entry. Subsequently, descriptive analysis was performed on each variable to generate frequency distributions. Reports of quantitative variables included frequency and percentage. The Kolmogorov-Smirnov test was used to confirm normalcy. The chi-square test was also used to compare the means of drug-poisoning variables and demographic variables (age, education, psychiatric history, and addiction history). A significance level of $P < 0.05$ was considered statistically significant.

Results

During the study period, 701 reviewed cases met the inclusion criteria. Regarding age distribution, the average \pm standard deviation for them was 35.02 ± 16.104 . Table 1 shows the distribution of education levels, with 45.8% of the population reporting education levels higher than high school and 54.2% lower than high school. Regarding their psychiatric history, the majority (66.6%) did not have a history in favor of psychiatric disorder. Moreover, the majority (55.6%) had no history of addiction.

In terms of drug poisoning, the majority of patients (48.9%, $n=343$) had addiction poisoning, followed by benzodiazepine poisoning (40.2%, $n=282$), with approximately 10% ($n=76$) of patients suffering from other causes. Of the studied cases, 3.4% ($n=24$) died and 96.6% ($n=677$) survived.

Table 2 displays the correlation between drug-poisoning variables and demographic variables. One-way ANOVA reveals a substantial correlation ($P < 0.05$) between the

Table 1. Frequency distribution of demographic variables of patients

Variable	Frequency (n)	Percent
Education		
Above high school	321	45.8
High school and below	380	54.2
Total	701	100.0
Psychiatric disorder		
No	467	66.6
Yes	234	33.4
Total	701	100.0
Opioid addiction		
No	390	55.6
Yes	311	44.4
Total	701	100.0

Education: Patients were categorized based on the highest level of education attained.

Psychiatric disorder: Indicates whether a patient has a diagnosed psychiatric disorder.

Opioid addiction: Reflects whether the patient has a history of opioid addiction.

Table 2. Relationship between demographic features and drug-poisoning variables

Variable	<i>n</i>	Mean	Std. deviation	95% confidence interval for mean		Minimum	Maximum	<i>P</i> value	
				Lower bound	Upper bound				
Age	Opium poisoning	343	37.043	0.89908	35.2753	38.8122	16.00	82.00	<0.001
	Benzodiazepine poisoning	282	32.081	0.83483	30.4382	33.7249	16.00	82.00	
	Other	76	36.828	2.19252	32.4612	41.1967	16.00	82.00	
	Total	701	35.024	0.60825	33.8300	36.2185	16.00	82.00	
Education	Opium poisoning	343	0.510	0.02703	0.4570	0.5634	0.00	1.00	0.012
	Benzodiazepine poisoning	282	0.606	0.02914	0.5490	0.6638	0.00	1.00	
	Other	76	0.447	0.05741	0.3330	0.5617	0.00	1.00	
	Total	701	0.542	0.01883	0.5051	0.5791	0.00	1.00	
Psychiatric disorder	Opium poisoning	343	0.265	0.02387	0.2183	0.3123	0.00	1.00	<0.001
	Benzodiazepine poisoning	282	0.432	0.02956	0.3744	0.4908	0.00	1.00	
	Other	76	0.276	0.05164	0.1735	0.3792	0.00	1.00	
	Total	701	0.333	0.01782	0.2988	0.3688	0.00	1.00	
Opioid addiction	Opium poisoning	343	0.510	0.02703	0.4570	0.5634	0.00	1.00	<0.001
	Benzodiazepine poisoning	282	0.411	0.02935	0.3536	0.4691	0.00	1.00	
	Other	76	0.263	0.05085	0.1619	0.3645	0.00	1.00	
	Total	701	0.443	0.01878	0.4068	0.4805	0.00	1.00	

Note: *P* values less than 0.05 indicate statistically significant differences between groups.

drug-poisoning variable and all demographic variables (age, education, psychiatric history, and addiction history).

Discussion

Poisoning continues to be a significant medical concern worldwide, with varied acute toxicity patterns in different geographical areas (1,11). This is also true for southern Iranian provinces, particularly Shiraz, where there is a shortage of information about poisonings. The goal of the current study was to ascertain the frequency and underlying causes of drug poisoning among patients who were admitted to the emergency department of Faghihi hospital in Shiraz during the first half of 2022. According to the results, nearly half of the 701 instances analyzed had an education level higher than high school, and their average age was 35.02. The majority of patients had neither a history of psychiatric disorders nor an addiction history. According to our results, the most common agents of poisoning were opium poisoning and benzodiazepine poisoning, with approximately 10% of patients poisoned due to other causes.

Abuse of narcotics is becoming a primary global health concern, especially in developing nations like Iran. Iran is ranked eighth in the world for drug abuse (11). Our findings align with previous research indicating the prominence of opioid-related poisoning. Opium poisoning accounted for 11.2% of poisoning cases in Tehran, with opioids reported as the most frequent cause. In terms of frequency and fatality rates, drugs and opioids came third in 2008 (12). Opium was the cause of 27.1% of fatal poisoning incidents in Tehran in 2012 (13); this percentage was surpassed only by

pharmaceutical medications. Narcotics accounted for 31% of poisoning incidents in 2010, making them the second most common cause after antidepressants (14). These consistent results across multiple studies demonstrate how urgently better drug regulations and preventative measures are needed to address the expanding problem of substance abuse worldwide.

Shifting trends in substance abuse highlight the increasing role of methadone poisoning. According to a 2014 study conducted in Tehran, methadone eventually supplanted opioids as the most frequent cause of poisoning (15). Adrenaline was the leading cause of mortality, followed by opioids. Substance misuse accounted for 38.3% of cases in Karaj; the most commonly used substance (18.3%) and the most prevalent cause of lethal poisoning was opium (16). Opium was the most frequent cause of poisoning in Babol among non-pharmaceutical reasons, second only to organophosphates (16). Opium was the most common reason for poisoning in Sari, second only to medications (7). Moreover, 10.3% of poisoning cases in Isfahan were related to substance misuse, whereas 6.25% of cases were caused by opium (17). These discrepancies likely stem from differences in drug accessibility, regional policies, and socioeconomic factors.

According to a study in Ahvaz, 10.9% of poisoning cases involved narcotic substances, while 50.4% of the cases involved non-pharmaceutical chemicals (18). Also, 3% of poisoning incidents in Kermanshah were related to illegal drug usage (19). Opioids accounted for the second most prevalent cause of toxicity in Birjand while illicit substances were the cause of 7.4% of cases (20). Methadone accounted for 23.8% of cases in Rafsanjan, while opium was responsible

for 8.1% of cases. In a study in six major cities in Iran, 4.4% of reported cases pertained to purposeful poisoning with opium, heroin, and other intoxicating substances, compared to 41.6% of cases associated with accidental poisoning (21). These studies validate our research findings and emphasize how crucial it is to deal with substance usage to avoid and treat poisoning.

On the other hand, pharmaceuticals are now the most common reason for toxicity due to increased accessibility, especially in underdeveloped nations (22). These medicines are frequently employed in situations of self-poisoning because of their effects on the central nervous system. In certain places, acetaminophen is a pain reliever particularly implicated in poisoning (22). In 2002, it was shown that benzodiazepines were the most prevalent cause of poisoning in Tehran (12) a trend reflected in our findings where benzodiazepine poisoning was highly prevalent. Of the 9203 patients who were poisoned in Tehran in 2007, 52% were caused by pharmaceutical medications (23). In another study in Tehran in 2008, hospitalizations were primarily driven drug poisoning, with the most common culprits being antidepressants, benzodiazepines, and anticonvulsants (24). Our study found similar patterns, particularly concerning benzodiazepines, with 89% of cases in 2009 related to prescription medicines. Antidepressants were involved in 57% of poisoning incidents in Tehran in 2012 (14), aligning with our data, which highlights the growing impact of psychiatric medications in poisoning cases. Pharmaceutical medications were revealed to be the cause of 27.5% of incidents of suicide in a 2012 study carried out in Tehran (13). Tramadol and benzodiazepines were the cause of 25.3% and 32.5% of cases in Karaj, respectively (16). Psychiatric pharmaceutical medications were the primary source of poisoning in Isfahan (17). Of the 266 poisoned patients in Shiraz, it was discovered that medication poisoning accounted for 68% of all poisoning cases (25). In Bandar Abbas, benzodiazepines accounted for 23.1% of cases and drug misuse for 26%. In Shahrekord, 89.34% of cases had a history of using several drugs (26). As all these studies demonstrate, the geographic pattern shows an increase in drug poisoning and benzodiazepine use from the north of Iran to the south.

Despite these consistent findings, our study has some limitations. One key limitation of this study is its generalizability. Since the study was conducted in a single hospital, the findings may not fully represent other hospitals or regions in Iran. Patterns of drug poisoning can vary based on geographical location, socioeconomic factors, and healthcare infrastructure, which may limit the applicability of these results to broader populations. Future studies involving multiple centers across different regions are recommended to enhance the generalizability of the findings. Patients may withhold information regarding the agents responsible for their poisoning or

past substance use. Additionally, psychiatric disorder history was based on self-reported data from patients or their relatives rather than official medical records, which were often unavailable.

The study's strength is that all poisoning patients were included during the study period. Follow-ups were done until discharge from the hospital, and urine toxicology was checked for all cases. The laboratory has also confirmed the medical history and the type of drug or substance consumed.

In addition to the prevalent causes of poisoning previously covered, additional significant elements need consideration: food, drink, chemicals, toxic plants, and organic materials (20).

Our findings underscore the need for enhanced public health interventions to prevent poisoning cases, particularly through stricter regulations on the sale and distribution of high-risk substances. Policymakers should consider implementing standardized toxicology screening protocols in hospitals to improve diagnostic consistency and facilitate more effective treatment strategies.

Further studies should explore the long-term health outcomes of patients who experience acute poisoning and the effectiveness of different treatment protocols in improving recovery rates. Additionally, research should investigate potential socio-demographic factors influencing poisoning cases, including socioeconomic status, geographic disparities, and access to healthcare. Broader, multicenter studies with larger sample sizes could also provide more generalizable insights into poisoning trends and inform targeted prevention efforts.

Conclusion

Our study highlights the significant burden of drug poisoning in Shiraz, Iran, particularly involving opioid and benzodiazepine toxicity. Given that a considerable proportion of poisoning cases were linked to addiction-related substances and psychiatric medications, it is essential to enhance regulatory measures on the availability of high-risk drugs while simultaneously expanding mental health services and substance abuse treatment programs.

Our findings suggest that policymakers should consider stricter regulations on the distribution of opioids and benzodiazepines alongside public awareness campaigns aimed at reducing misuse. Moreover, establishing regional poison control centers and enhancing emergency response capacities could significantly improve patient outcomes.

While this study provides valuable epidemiological insights, further research is required to address remaining knowledge gaps. Future studies should investigate long-term health outcomes in patients who survive acute poisoning. Exploring the impact of socioeconomic factors on poisoning can identify at-risk populations. Conducting multicenter research across different regions is recommended to enhance the generalizability of findings.

Authors' Contribution

Conceptualization: Ehsan Alishapour.
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Validation: Ehsan Alishapour, Samard Mehrabi.
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Competing Interests

None.

Ethical Approval

The Ethics Committee of Shiraz University of Medical Sciences (Iran) approved this study, with the code of ethics IR.SUMS.MED.REC.1402.186. The study was a retrospective chart review, and the Ethics Committee waived the informed consent.

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