

Research Paper: Criminal Poisoning: A Hospital-Based Survey in an Academic Center of Iran



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ABSTRACT

Background: One of the most common medical emergencies worldwide is deliberate or accidental poisoning. The ever-increasing consumption of toxins and fatal drugs is getting more critical by the time. The purpose of intentional poisoning is to harm self and others. It includes objectives like robbery, sexual abusing (rape). The perpetrators of sedative and hypnotic drugs could sedate patients and make them sleepy.

Methods: This descriptive, cross-sectional study investigated the suspected Drug-Facilitated Crime (DFC) admitted patients and Outpatient Department (OPD) in the emergency room and toxicology ward. A researcher-made questionnaire was completed for each patient. The biological samples (urine, blood) were provided to a clinical toxicology lab.

Results: The information of 40 suspected DFC patients was analyzed. 70% of intoxicated patients were men, and 30% were women. The patients' mean age was 31-43 years; 42% were low in education, and 37% were self-employed. Furthermore, 75% of total intoxicated patients had a sedentary level of consciousness. Approximately 92.5% had one positive substance test, and 7.5% had negative lab test results. The most used drug was diazepam, by 70%. The motivation for poisoning was 80% robbery, 12.5% for rape, and 7.5% were no diagnostic.

Conclusion: The prevalence of poisoning, especially deliberate poisoning, is dramatically growing in this part of the world. Accordingly, this study reveals the flexibility of criminals in Tehran Province, Iran. Thus, the Ministry of Health should seriously control legal and illegal drugs purchase.

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1 Introduction

In recent years, the problem of Drug Facilitated Crime (DFC), criminal offenses in which drug effects compromise the victims' control over their actions and their ability to resist, the victim is incapacitated or unconscious due to the impact of benzodiazepines or drugs [1]. In other words, DFC is a general term that includes rape, assault, extortion, theft, human trafficking, abuse by the elderly, children, and the mentally-ill subjects. Individuals intentionally mistreat it under the influence of psychoactive substances [1, 2]. Besides, DFCs are crimes in which a psychotropic product is used for criminal purposes without the victim's knowledge to create incapacity and thus facilitate theft or rape [3, 4]. After the optional use of a debilitating substance, this process may cause a subject to become disabled and weak and contribute to their abuse without their consent [5]. Psychotropic substances used in DFCs may affect the victim's awareness, alertness, judgment, and memory. Such materials can make the victim vulnerable and unable to fight their attacks. They can also calm the victim down to be more readily transferred by the offenders [2]. DFC agents can be strangers or acquaintances; most of the substances used in DFC suppress centers with rapid function in the Central Nervous System (CNS) and cause a condition similar to severe alcohol intoxication or general anesthesia [5, 6].

Many studies have not obtained complete information on the drugs used due to some victims' concerns that voluntary use of drugs, like cannabis, can affect the trial. Physicians need to reassure the victim that this information is required to help them [3, 7]. Physicians should also consider that even if the victim has voluntarily taken medication, their disability should not be overlooked if they have been victims of a crime. In addition to collecting biological evidence from the plaintiff, evidence from the crime scene must also be gathered [2, 8].

It is essential to remember that numerous drugs used in DFCs, including alcohol, may cause clinical symptoms similar to those of other drugs in a single complainant. Therefore, it is impossible to conclude that the plaintiff's inability is due to the existence of a specific substance without evidence that a particular substance (or a particular marker/metabolite) is present in a sample of the plaintiff [3]. Besides, since most drugs are metabolized, and their excretion rate varies, it should never be assumed that the negative findings of the toxicology prove that the disabling drug did not exist when the crime was alleged [9, 10].

Clinical laboratory tests that indicate the effects or presence of drugs can be helpful in the patient's emergency evaluation with an overdose. ED staff may be required to obtain urine or blood specimens in situations of suspected drug-facilitated sexual assault or by order of arresting officers. Such testing requires specific procedures for collection and submission to a reference laboratory or program. Date rape agents like flunitrazepam and Gamma Hydroxy Butyrate (GHB) require testing in a specialized reference laboratory. Urine and serum specimens of this type should be frozen and retained until such an analysis is requested [11].

Finally, the interpretation of toxicological findings can be challenging. Additionally, due to individual differences in drug metabolism, it is usually challenging to determine the exact dose and exposure timing. Besides, not identifying a drug or metabolite does not always mean that it has not been used [2, 3]. There is currently no international standard for facilitating detecting and identifying drugs used in DFCs [5, 10]. Therefore, this research was conducted to investigate the process of criminal poisoning with sedative-hypnotic drugs in Loghman Hakim Hospital from November 2018 to June 2019.

2. Materials and Methods

The present study aimed to identify the extent and types of drugs found in alleged drug-facilitated crime. DFC is any crime in which the victim is administered a drug or other incapacitating substance to affect control over their action, decision-making, or biopsychological capabilities then referred to the emergency department by relatives, friends, and Emergency Medical Services (EMS) [3, 12]. This evaluation included all the patients referred to the Loghman Hospital emergency department from November 2018 to June 2019.

All the patients intoxicated with sedative-Hypnotics drugs were investigated in this study. Demographic information (age, gender) and clinical information in patients' files, including the level of consciousness and vital signs, were designed to be included in a questionnaire.

Biological samples containing 30 mL of urine, 5 mL of blood in sterile and special containers (urine in sterile plastic container & blood in clots for clotted tubes) were collected and provided to the Medical Toxicology Laboratory for analysis, immunochromatography, chromatography. Thin-Layer Chromatography (TLC) and High-Performance Liquid Chromatography (HPLC) were referred. Besides, SPSS software analysis was used to evaluate the collected results.

In this study, all experiments were performed on the urine and blood samples of poisoning victims in Loghman Hakim Hospital in Tehran City, Iran, to investigate the criminal process and its cause. All required samples were collected following scientific principles and existing standards and sent to the toxicology laboratory for toxicological experiments to prevent errors and loss of drugs and toxins, samples taken by cold chain management, and immediately provided to the laboratory. The urine sample at 4 °C and the blood sample in the freezer at -22 °C were stored until evaluated.

All stages of preparation of samples and analysis of drugs and toxins were performed based on the Standards of Operating Procedures (SOPs Guidelines) of the Laboratory of Forensic Toxicology; they were submitted by the headquarters of the Forensic Medicine Organization.

According to these instructions and the available facilities, in general, liquid-based extraction methods were used to prepare and extract all kinds of drugs and toxins. In this study, first immunochromatography and Thin-Layer Chromatography (TLC) were used as screening tests, and then High-Performance Liquid Chromatography (HPLC) was used to confirm the results.

Ethical considerations

In this evaluation, patients with inclusion criteria were considered to study groups. Based on the ethical index, patients' information is entirely confidential and presented only as a final report (code: IR.SBMU.RETEC.REC.1397.1332). In this study, SPSS was used to analyze the obtained data.

3. Results

According to evaluated cases from November 2018 to June 2019, it has been observed that 70% of intoxicated patients were men, and 30% were women. The results revealed that 37.5% of suspected DFC patients were 31 to 43, 35% of cases were 18 to 30, 15% were 44 to 56, and 12.5% were 57 to 70 years of age (Table 1). Other demographic and essential information is shown in (Table 2). In the field of patient-level consciousness, it was observed that 75% of people were at a passive level, 17.5% were oriented, and 7.5% were mild com and vital signs of the cases shown in (Table 3). Also, in the field of poisoning place, 30% were in the workplace, 17.5% of patients suspected of DFC were in the park, 17.5% were in a vehicle, 15% were in the home location, 10% were in the dormitory, 7.5% were in the garden, and 2.5%

were unspecified. Also, 90% were observed in food as drinking, 7.5% as oral, and 2.5% as uncertain.

In the context of the offender's intent, it was found that 80% of cases were poisoned with the plan to steal, 12.5% for rape, and 7.5% were unidentified (Table 4). From the victims' gender, 70% were men, 30% were women. In the case of vital signs, it is observed that all of them were normal. Three patients were also admitted to the ICU; two points were male, one case was female, three cases (7.5%) were intubated, and the ICU was recognized. Finally, they were discharged with proper recovery and typical vital signs. No mortality was observed.

Besides, only four drugs have a confirmation test in evaluating the type of drug used. With a confirmation test (Benzodiazepines), it was observed that Diazepam was the most used drug in 26 positive cases (70.27%). It was followed by clonazepam in 35.14% of cases, oxazepam in 24.32% of cases, morphine in 18.92% of cases, amphetamine, and methamphetamine in 10.81% alprazolam, and methadone in 5.41% of cases, tramadol in 2.70% of cases. Therefore, Diazepam was the most common form of criminal poisoning (Figure 1).

4. Discussion

In this study, the most commonly detected was diazepam in 26 cases. All study patients overlooked the time when they became unconscious. However, the possible time of the incidence and admission times were similar to those observed in other studies. Most of the victims remembered that they had been offered various food, drink items, i.e., familiar with this group of victims. All victims had lost their valuables, illustrating the purpose of robbery. Criminals engaging in this type of drug-facilitated robbery in Tehran may be linked with more extensive organized crime networks. These need to be identified, neutralized, and brought to justice by the law-enforcing agencies of the government to disrupt the criminal chain to protect the individuals from being robbed.

To date, several studies have presented different results in this regard. This issue has been discussed in a survey conducted for this diagnostic method. Reidy et al. reported that 58% of victims were positive for cannabis, 43% for alcohol victims, 26% for cocaine, 13% for amphetamines, 11% for benzodiazepines, 11% for drugs, and 5% for methamphetamine. In the present study, diazepam was the most common cause of poisoning in the study subjects. They also had their urine samples analyzed by toxicology, while in the present study, in addition to urine, their blood samples were also analyzed.

Table 1. The age and gender of the evaluated patients

Variables		No. (%)
Gender	Male	28(70)
	Female	12(30)
Age, y	31-43	15(37.5)
	18-30	14(35)
	44-56	6(15)
	57-70	5(12.5)

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In total, 80% of cases were poisoned with intent to steal, 12.5% for rape, and 7.5% remained unidentified.

Most victims studied in the research were women who were raped; however, in the present study, the predominant gender was men to steal purposes [13]. In another study, Basher et al. found that the client's poisoners had a Glasgow Coma Scale (GCS) level of 10-5, while in the acoustic assessment, 75% of the poisoned had a sedentary group of GCS, 17.5% were oriented, and 7.5% were light coma [14]. Other studies reported more in-depth data on presentation loss of consciousness [15, 16].

In both assessments, benzodiazepines were the most commonly used drug by criminals, and poisoning when using public transport was a common risk in this study; however, according to the present study, most poisonings occurred in workplaces and public transport parks [13]. According to Gharedaghi et al., the most common site of poisoning during the past decade was in vehicles, while the most common site of poisoning in the present study was at the workplace [4]. Fiorentin et al. highlighted Delhi and Chittagon, where these crimes were widespread on the eve of religious festivals [14]. They also found that ethanol in 30.9% of cases was as most commonly used substance in sexual offenses, followed by cannabinoids in 28.8%, amphetamine, and methamphetamine in 16.5%, cocaine in 10.10%, and clonazepam in 7.6%. However, diazepam was the most widely used drug in this study, i.e., differed. Using amphetamine

and methamphetamine stimulants, clonazepam, and morphine in Iran and the United States has been a common substance used in sexual crimes [14]. In previous studies in the UK, diazepam, temazepam, ecstasy, and GHB were used for DFC [16].

In another study, Gauthy et al. found that the poisoned cases were 21 children and 39 adults. In the present study, there was no evidence that the poisoned child was referred to Loghman Hakim Hospital in Tehran [8]. Substances that have caused toxic poisoning in children include sympathomimetics, opioids, caffeine, marijuana, detergents, alcohol, benzodiazepines, sertraline, sodium hypochlorite, and acetaminophen. In the present study, diazepam was the most widely used drug, followed by clonazepam, oxazepam, morphine, amphetamine, methamphetamine, alprazolam, methadone, and tramadol. Accordingly, the cases of poisoning observed in the evaluated studies have differed depending on the poisoning environment and their criminal purpose. According to previous studies, the most commonly used substance in criminal poisoning was benzodiazepines, cannabis, ethanol, and sympathomimetics. Our research also indicated the abuse of various benzodiazepine compounds and other legal and illegal drugs. Accordingly, more appropriate treatment methods can be used to treat them and reduce the complications caused by poisoning.

Table 2. The intention on poisoning in the evaluated patients

Intention	No. (%)
Theft	32(80)
Rape	5(12.5)
Uncertain	3(7.5)

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Table 3. The vital signs of the drug-facilitated crime victims

Variable	Mean±SD	Max.	Min.
Systolic blood pressure	111.90±10.09	153	90
Diastolic blood pressure	66.23±9.04	90	50
Pulse rate	81.79±7.77	114	67
Respiratory rate	16.78±1.38	18	13
Body temperature	37.20±0.303	38	37

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In this study, we overlooked measuring the concentration of the medication in biological samples obtained from patients; HPLCs was used as a confirmatory method only for benzodiazepines. The other limitation was missing the possible deceased patients because this study was only performed in hospitalized patients. the cultural situation of the society that does not let the victims claim their sexual assault is another limitation that may cause the case missing.

5. Conclusion

This study reveals the flexibility of the criminals in Tehran, using different mixtures of benzodiazepines to hinder, then defraud their victims. The Ministry of Health and Medical Education of Iran should control legal and illegal drugs purchase. Therefore, to have a healthy society, it is necessary to legislate some rules for limiting drug accessibility to prevent abusing them.

Ethical Considerations

Compliance with ethical guidelines

The Ethics Committee approved the study of Shahid Beheshti University of medical sciences (code: IR.SBMU.RETEC.REC.1397.1332).

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Author's contributions

Conceptualization, methodology and supervision: Mitra Rahimi; Investigation, writing – original draft, and writing – review & editing, data analysis, funding ac-

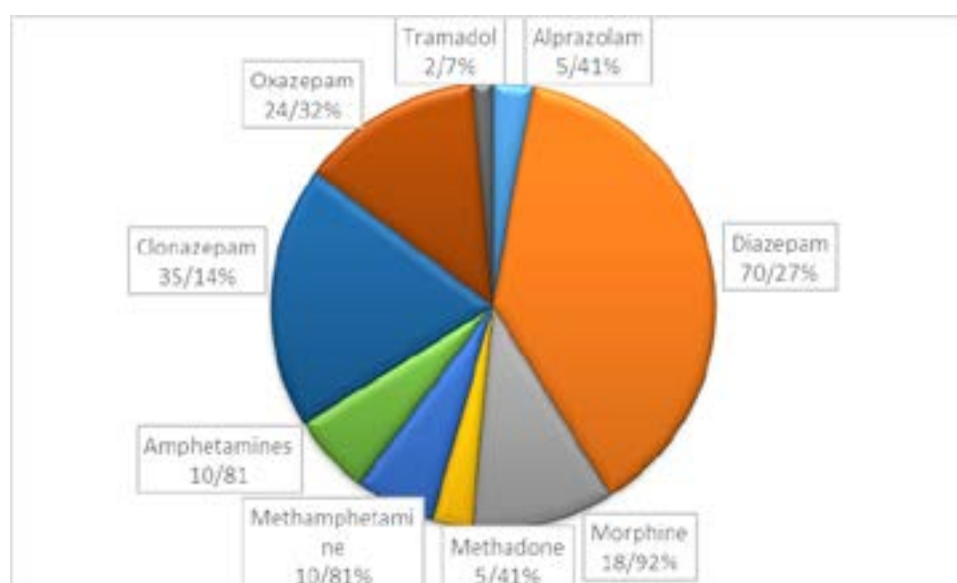
**Figure 1.** Frequency of the type of drug used to cause poisoningInternational Journal of
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Table 4. The demographic and basic information of the study sample

Variables		%
Marital status	Married	60
	Single	40
Job	Chemical engineer	2.5
	Employee	2.5
	Nurse	5
	Hairdresser	5
	Retired	7.5
	Student	7.5
	Worker	10
	Driver	12.5
	Housekeeper	15
	Self-employed	32.5
Level of education	Master's degree	2.5
	Illiterate	5
	Bachelor	15
	Diploma	32.5
	High school degree	42.5
Admission	Not defined	2.5
	Emergency	37.5
	Patient family	25
	The patient	12.5
	Friend	5
Edible offered	Not defined	20
	Fruit juice	50
	Tea	15
	Syrup	10
	Dough	5
	Coffee	7.5
	Chocolate milk	2.5
	Cake	2.5
	Food	5
	Not defined	2.5
Duration of hospital	24 hours	92.5
	≥24	7.5
Type of consumption	Optional	90
	Mandatory	7.5
	Not defined	2.5

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Conflict of interest

The authors reported no conflict of interest.

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