

## Research Paper

# Investigating the Unintentional Poisoning Epidemiology in Prehospital Emergency Center in Qaemshahr City, Iran



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## ABSTRACT

**Background:** Unintentional poisoning is a critical type of poisoning by which people injure themselves with no intention. Such a condition occurs accidentally, occupationally, or through abusive manners. The present study aims to examine the one-year frequency and causes of unintentional poisoning in patients treated by the prehospital emergency center in Qaemshahr City, Iran, in 2016.

**Materials and Methods:** This is a cross-sectional descriptive study of 259 patients with unintentional poisoning. The variables were extracted and then registered in the questionnaires. The data were analyzed by the SPSS software.

**Results:** In this study, 83.8% of the patients were male and 16.2% were female. Most toxicity cases (89.1%) were unintentional as a result of drug abuse in the forms of tramadol abuse (42.8%), narcotic drugs (26.6%), and alcohol (19.7%), ranking 1 to 3, respectively. A total of 48.2% of the unintentional poisoning cases were caused by medicinal factors and other cases (51.8%) were due to non-medicinal agents. Benzodiazepines and cardiovascular drugs were the most common drugs causing a medicinal overdose. Gastrointestinal poisoning was the most prevalent way of toxicity (77.6%) and the rate of death was 4%.

**Conclusion:** The results of the present study and similar research show that unintentional poisoning includes large populations of toxicity cases that occur mainly by drug abuse, such as tramadol and narcotic drugs. This study can be considered a pattern to conduct more research in the relevant fields.

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## 1. Introduction

**P**oisoning is one of the common medical emergencies that cause death [1, 2]. Poisoning is a state following the entry of poison into the human body, occurring because of deliberate or accidental contact with harmful medicinal and chemical substances [3]. Unintentional poisoning is one of the main types of poisoning that can be caused by a person unintentionally and in different ways, namely accidentally, occupationally, or via abuse or overdose [4]. Unintentional poisonings in the workplace are mainly caused by improper use of chemical agents at the workplace, lack of proper labels on materials, misreading of labels, and wrong compounds. Accidental poisonings mainly occur in children and adults over the age of 50 years. Unintentional poisonings are more common in the elderly because of the decline in the accuracy of patients and easy access to various kinds of drugs [3]. Unintentional poisoning is common in children because of their inquisitive nature and their desire to imitate their parents which can lead to increased complications and death in childhood [5].

Statistics show a significant increase in unintentional poisonings worldwide. Deaths because of unintentional poisoning in the United States have increased significantly [6]. According to the latest statistics from the American Association of Poison Control Center (AAPCC), about 78% of poisoning cases (that is, more than two million people) were related to unintentional poisoning. Drug overdoses in the United States have quadrupled since 1999 [7]. In India, deaths due to unintentional poisoning increased by 502% from 1999 to 2009 [8]. Unintentional poisoning is the fourth cause of death in terms of unintentional accidents in the age group of 15 to 29 years worldwide [9]. According to the latest report by the World Health Organization, 346,000 deaths occurred because of unintentional poisoning, and 91% of these deaths occurred in low-income countries. Unintentional poisoning has caused the loss of more than 10.7 million years of healthy life [10].

Also, statistics show that various types of unintentional poisoning are high in Iran. The results of the research by the forensic medicine organization of the country in 2015 show that drug poisoning is the second reason for visiting hospitals in Iran, causing the highest death rate [11]. According to a study conducted from 2011 to 2016 in Mazandaran City, Iran, the most common cause of poisoning leading to death was opium [12]. In recent years, tramadol poisoning, which occurs because of abuse, has become the main reason for

admission to emergency departments in Iran [13]. Studies among Iranian students show that the abuse of Ritalin (a stimulant drug from the amphetamine family) ranks fifth after alcohol, hashish, opium, and tramadol [14]. In a study conducted in Sari City, Iran, on 2057 cases of poisoned patients, it was shown that 0.97% of the cases were poisoned by poisonous plants [15]. Scorpion bites and some poisoning caused by spiders are major health problems in the south and southwest of Iran [16].

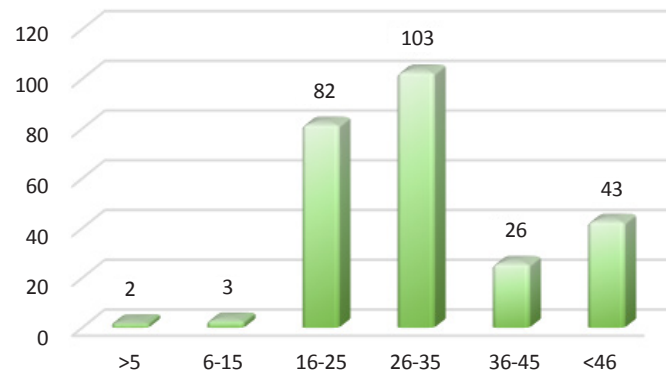
The pattern of poisoning in a country depends on various factors, including access to various poisons, geographical and climatic conditions, social, economic, and cultural conditions, along with religious beliefs of the society. As awareness of the pattern of poisoning is vital in identifying risk factors and early diagnosis of poisoning, as well as in designing strategies to reduce the risks of accidental poisonings [17], the current study aims to investigate the one-year frequency of unintentional poisonings in emergency Departments in Qaemshahr City, Iran, in 2016.

## 2. Materials and Methods

This is a descriptive-sectional study. In this research, the files of 12 552 patients who contacted the Medical Emergency and Accident Management Center in Qaemshahr City, Iran, in 2016 were examined, and finally, 259 patients with unintentional poisoning were identified. The criteria for the diagnosis of unintentional poisoning were the reports and documents recorded in the patient's medical records. The samples were collected by examining the files of patients with unintentional poisoning in the archive department of this center. The investigated variables included demographic information (age, gender, and place of residence) and information related to poisoning, including the agent of poisoning, the method of consumption, the way of poisoning, the time of the poisoning, the way of poisoning, the history of illnesses and addictions, the degree of poisoning, the final state, therapeutic interventions, counseling, and the antidotes used which were extracted, entered and recorded in the checklist. The data were entered into the SPSS software. Then, the Mean±SD were calculated. The data were evaluated by the analysis of variance (ANOVA), and  $P < 0.05$  was considered significant.

## 3. Results

According to the present study which was conducted over 12 months, from the beginning of March 2016 to the end of March 2017, out of 12 552 registered cases, 398 people were poisoned, of which 259 people contacted the emergency department after being diagnosed with accidental poisoning



**Figure 1.** Frequency distribution of unintentional poisonings in terms of age

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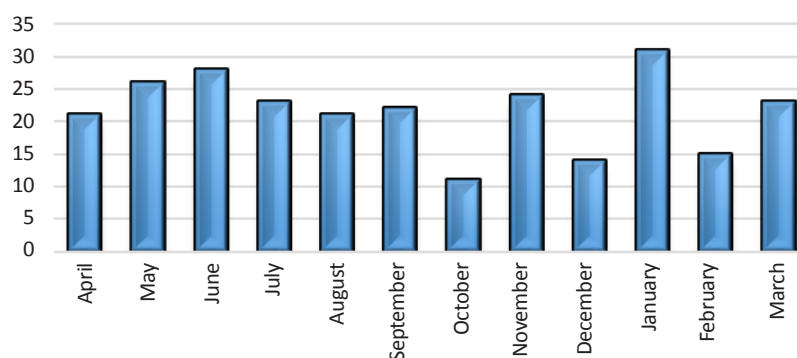
and were investigated and treated. In terms of gender distribution, 83.8% (n=217) were male and 16.2% (n=42) were female. The results show that the lowest prevalence of poisoning include the age group of individuals younger than 5 years (0.8%) and the highest prevalence is related to subjects in the age group of 26 to 35 years (39.8%). The youngest person was 3 years old and the oldest was 88 years old. [Figure 1](#) shows the distribution of the frequency of unintentional poisoning in terms of age.

A total of 201 poisoned individuals (77.6%) lived in urban areas and 58 people (22.4%) lived in villages. The most common place where the poisoning occurred was the home with 64.1%. The rest included streets (18.1%), shops (7.3%), offices (1.2%), schools and universities (1.6%), and so on, respectively.

The results of the study show that 48.2% (n=125) of unintentional poisonings were related to medicinal agents and the rest, (51.8%) were related to non-medicinal agents. In terms of the type of poisoning, the majority of unintentional poisonings (89.1%) occurred due to abuse ([Table 1](#)). Among them, tramadol is the most

common factor that leads to abuse with 42.8% (n=111). Narcotics and their derivatives, such as opium, heroin, and hashish (26.6%) are in the second rank, and alcohol (19.7%) is in the third rank. In addition, drug overdose with 5.6% (n=14) and accidental poisoning with 5.6% (n=14) are the next most common types of unintentional poisoning. In this study, drugs, such as benzodiazepines, cardiovascular drugs, antibiotics, and antidiabetic drugs caused drug overdose. [Table 1](#) lists the factors that caused accidental poisoning, including bites, chemicals, carbon monoxide gas, organophosphorus poisons, food, and poisonous plants.

The most common way of exposure to toxins is through digestion (77.6%), followed by inhalation (20.1%) and injection (2.3%). The frequency of poisonings in different seasons and months of the year shows that the most poisonings occurred in spring (28.6%), summer (26.3%), and winter (26.3%), respectively. The lowest prevalence of poisoning was in autumn (18.9%). January had the highest prevalence of poisoning with 12%, and September and November had the lowest prevalence, as shown in [Figure 2](#).



**Figure 2.** Distribution of the frequency of unintentional poisonings provided by emergency department in qaemshahr in terms of months in 2016

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**Table 1.** Frequency of the type of substance used in unintentional poisoning by gender

No.	Type of Poisoning	No. (%)	No. (%)	
			Male (%)	Female (%)
1	Tramadol	111(42.8)	106(40.9)	5(2)
2	Narcotics	69(26.6)	60(23.1)	9(3.5)
3	Alcohol	51(19.7)	41(15.8)	10(3.9)
4	Bites	5(2)	3(1.2)	2(0.8)
5	Benzodiazepines	4(1.6)	1(0.4)	3(1.2)
6	Cardiovascular	4(1.6)	2(0.8)	2(0.8)
7	Antibiotics	3(1.2)	0(0)	3(1.2)
8	Anti-diabetes	3(1.2)	0(0)	3(1.2)
9	Chemicals	3(1.2)	2(0.8)	1(0.4)
10	Carbon monoxide	3(1.2)	0(0)	3(1.2)
11	Organophosphorus	1(0.4)	1(0.4)	0(0)
12	Food poisoning	1(0.4)	1(0.4)	0(0)
13	Poisonous plants	1(0.4)	0(0)	1(0.4)
14	Total	259(100)	217(83.8)	42(16.2)

A total of 141 patients (54.4%) had no history of the disease while 34.4% had a history of drug use and 1.5% had a history of mental illness. Other diseases included cardiovascular diseases (5.8%), diabetes (1.5%), respiratory disorders (0.4%), and hypertension (0.8%), respectively. Regarding the time of the poisoning, 58.3% (n=151) of patients called the emergency department during the day and 41.7% (n=108) at night. In 21.2% of the cases, the telephone consultation with the doctor of the communication center was done by emergency experts.

The supportive care given to the poisoned people included airway support, oxygen delivery, arrhythmia treatment, hemodynamic support, seizure treatment, and prevention of secondary complications. The most performed treatment measures were the establishment of an intravenous line, oxygen therapy, serum therapy, drug interventions, and giving an antidote. Also, advanced cardiopulmonary resuscitation procedures were performed for 2 poisoned people. Most drugs used in the treatment of poisoning included diazepam (8.1%), Plazil (2.7%), and epinephrine (1.2%), along

with drugs, such as ondansetron, haloperidol, biperidine, salbutamol, and hydrocortisone.

For the treatment of poisoning, an antidote or specific treatment was used in 24.4% of cases, that is, 23.6% (n=61) used naloxone and 0.8% (n=2) used atropine while other patients (75.7%) did not receive an antidote. After performing the required treatment measures, 68.3% (n=177) of the patients were transferred to an equipped treatment center, 3.9% (n=10) received outpatient treatment, 27.4% (n=71) refused to continue the treatment and one person (0.4%) died.

#### 4. Discussion

The present research was conducted to determine the prevalence and causes of unintentional poisoning in Qaemshahr City, Iran in 2016. It was determined that 65.1% of the poisonings were unintentional and the rest were intentional. This rate was reported at 8.7% in Masoumi's study, 24% in Azin's study, 28.2% in Qasempuri's study, 33% in Tabibzadeh's study, 44% in Mohammadi's study, 46.5% in Moghadamnia's study, and 80.4% in Jafarzadeh's study for the total poison-

ings, which indicates the high percentage of unintentional poisonings in Qaemshahr City, Iran, compared to most parts of Iran [18-24]. Statistics in foreign studies are different. This rate is reported at 10% in Morocco (2015), 17% in Slovenia (2005-2001), and 43.3% in China (2016-2012) [25-27].

The findings showed that the rate of unintentional poisoning in men (83.8%) is higher compared to women (16.2%). These results were consistent with the findings of the study conducted by Shokrzadeh [28], Fazel Tolmi [4], Mohammadi [22], and Afzali [29]. The amount of drug abuse in men (86.9%) is also higher compared to women (13.1%), which is consistent with the results of the study by Jabalameli [30] and Goudarzi [31]. Men suffered alcohol poisoning more than women (80% in men vs 20% in women), which confirms the results of previous studies in Iran and other parts of the world [32-34]. Also, tramadol poisoning was 95.5% in men compared to 4.5% in women, which is consistent with the results of a study conducted in 2008 at Loqman Hakim Hospital in Tehran City, Iran (71.9% in men and 28.1% in women) [35]. The high share of men compared to women in the present study can be due to drug abuse more than 80% of unintentional poisonings. In this regard, men tend to abuse drugs more than women because of having special characteristics, predisposing backgrounds, and social, and cultural and racial issues [28].

The results of this research show that the high frequency of unintentional poisoning is in the age range of 26-35 years, and children and people under 15 years have a very low percentage (Figure 1, Table 2), while it has been found in many studies that the majority of accidental poisonings occur in children under 7 years of age [21, 36-38]. In the present study, about 76.4% of all unintentional poisonings occurred among people under 35 years of age. In the study conducted by Shokrzadeh [28], the highest prevalence of poisoning was among the age group under 30 years old, and in the study conducted by Tolami [4], it was common in the age group of 20 to 40 years old, which was consistent with our study. However, the study results of Jafarzadeh [19] in Fasa City, Iran show that most of the studied people were 36-59 years old, which is not consistent with our study. In the present study, 0.8% of unintentional poisonings occurred in children under 5 years of age. The cause of poisoning among children can be due to a sense of curiosity, increased excitement, lack of information about the type of substance, and parents' negligence. Ways to prevent poisoning in children include educating parents, keeping chemicals and drugs out of reach of children, determining the bitter taste of drugs, and special protective containers [38].

The most common way of exposure to toxins in the studied population was the digestive way (77.6%), which was consistent with the results of previous research [21, 22, 39, 40]. The main reason for using this method is its simplicity and ease. But the results of other studies show that inhalation poisoning is the most common way to cause poisoning, which is inconsistent with the present study. Accordingly, in a study conducted in Shushtari Hospital in Shiraz City, Iran, during 2008-2010, about 60.8% of poisonings were related to the inhalation method [31, 41]. Inhalation poisoning can occur as a result of drug consumption, inhalation of carbon monoxide gas, inhalation of household and industrial detergents, as well as organophosphorus poisons in agricultural fields. In two studies conducted in Tehran City, Iran and Mazandaran City, Iran, the injection method was the most common method of poisoning [42, 43], which seems to be the reason for the difference in the study population, where most of them were injection addicts. In the present study, it was found that 2.3% of poisonings were caused by bites (snake and bee bites) and dog bites. This rate includes 1.6% in Mehdizadeh's study (Babol City, Iran), 5.1% in Shekarzadeh's study (Gorgan City, Iran), 5.8% in Moghadamnia (Babol City, Iran), 4% in Fazeltolami's study (Gilan City, Iran), and 2.9% in Kabirzadeh's study (Mazandaran City, Iran) [4, 21, 28, 39, 44].

The place of living of 201 people (76.6%) of the poisoned people was in urban areas and 58 subjects (22.4%) were in villages, which the results of past studies confirm [19, 45, 46]. One of the reasons for the increase in poisoning in urban areas is the ease of access to drugs and pharmacies. Therefore, it seems necessary to carry out more studies in the fields of urban life skills and social and cultural issues to take preventive measures and plan to reduce poisoning. The most common place where the poisoning occurred was the home with 64.1%, which is consistent with the results of Jafarzadeh's study in Fasa City, Iran [19]. Also, in America, 93% of unintentional poisonings happened in the person's home or place of living, which is consistent with the present study [7].

In terms of the type of poisoning, the majority of unintentional poisonings (89.1%) occurred due to abuse, among which tramadol (42.8%), narcotics (26.6%), and alcohol (19.7%) are in the first to third ranks, respectively. Other cases were unintentional poisonings caused by drug overdose and accidental poisonings. According to the results of other drug studies, abuse is the main factor in unintentional poisonings, which is not consistent with the present study [4, 18, 20, 28]. Tramadol consumption in Iran and other parts of the world has been rising in the past few years so the study

**Table 2.** Frequency of unintentional poisonings in the pre-hospital emergency of Qaemshahr City, Iran, according to some variables in the studied patients

Variables		No. (%)
Gender	Male	217(83.8)
	Female	42(16.2)
Place of living	City	201(77.6)
	Village	58(22.4)
Type of poisoning	Abuse	231(89.1)
	Overdose	14(5.6)
	Accidental	14(5.6)
Poisoning way	Digestive	201(77.6)
	Inhalation	52(20.1)
	Injectable	6(2.3)
Disease background	History of addiction	89(34.4)
	Mental illness	4(1.5)
	Other diseases	25(9.7)
	Unknown	2(0.8)
Time of poisoning	Absence of illness	139(53.7)
	Day	151(58.3)
	Night	108(41.7)
Receiving antidote	Naloxone	61(23.6)
	Atropine	2(0.8)
	No received	198(75.7)

results of Farzaneh [45], Shadnia [35], and Taremian [47] in Iran and Burch [48] abroad confirm this issue, which is consistent with our study. In another study conducted in Rafsanjan City, Iran in 2013-2014 by Aghakhani et al., methadone was the most common cause of accidental poisoning, which mostly occurred in children under 10 years of age (68.3%), which is inconsistent with our study. The reason for the increase in the use of tramadol among young people may be that it is easily available in pharmacies and on the street in the form of food. It is also possible to refer to the confusion of parents and the government regarding the negative consequences of consuming tramadol, especially its addictiveness and the lack of serious concern to design and implement programs to prevent abuse

[49]. This study was conducted to examine poisoning in children accidentally and in adults because of drug abuse or overdose.

The highest prevalence of unintentional poisoning occurred in the spring (28.6%) and the lowest prevalence was in the fall (18.9%). In a study conducted by Moghadamnia, poisoning was the least common in fall and winter, and according to Jafarzadeh's study in Fasa City, Iran, poisoning was the most common in spring and summer, which is consistent with the present study [19, 21]. The cause of unintentional poisoning has a different prevalence in different seasons and different places. For example, in winter and fall, carbon monoxide poisoning and during the growing seasons,

poisoning with agricultural toxins and food poisoning are reported more [21]. The mortality rate in the present study was 0.4%, which is lower than the results of Shekarzadeh's study with 6.8% [28], Masoumi with 0.6% [50], and Qasempuri with 1.42% [24]; however, this rate was higher compared to the results of Jafarzadeh's study in Fasa City, Iran [19].

## 5. Conclusion

The results of the present study along with similar studies indicate that unintentional poisonings comprise a large part of poisonings. This issue can be considered a model to conduct more studies in related fields. The results of the present study showed that the majority of unintentional poisonings occur as a result of the abuse of medicines and drugs. In addition, we see a higher percentage of men than women. It seems that the familiarization of the staff working in the pre-hospital emergency department with the toxicological characteristics and classification of drugs, knowing the signs, and symptoms and various diagnostic methods in poisoned patients, and using the appropriate and up-to-date facilities and equipment in ambulances can reduce mortality and life-threatening risks caused by poisoning. Accordingly, cases, such as suitable training programs for parents, training on how to care and necessary precautions for farmers and factory workers, and prescribing narcotics to patients by doctors with the lowest dose are suggested to reduce unintentional poisonings.

## Ethical Considerations

### Compliance with ethical guidelines

This article is adapted from the thesis of Jamal Rezaei Orimi, a Master's student in the history of medical sciences at [Mazandaran University of Medical Sciences](#), and its ethical approval has been obtained with the following Ethics (Code: IR.MAZUMS.REC.95.2509).

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### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declare no conflict of interest.

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