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Epidemiological Study of Unintentional Poisonings of Patients Referred to Teaching Hospitals in Shahroud in 2020-2022

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Abstract

Background: *Poisonings are a significant cause of hospital admissions and can lead to serious health issues, including death. Since the causes of poisoning can vary by region, it is essential to identify them for effective diagnosis and treatment. This study examined the patterns of unintentional poisonings among patients at Shahroud teaching hospitals.*

Methods: *This study employed a descriptive cross-sectional design to collect data on patients hospitalised for unintentional poisoning at hospitals affiliated with Shahroud University of Medical Sciences. Data collection occurred from March 20, 2020, to March 20, 2022, using a researcher-developed checklist. The data were analysed using both descriptive and analytical statistical tests in SPSS version 22.*

Results: *A total of 377 individuals were hospitalised for unintentional poisoning, with a mean age of 29.57 years. Among the cases studied, 65% were male, while 55.4% were single, and 69.5% lived in urban areas. Notably, 92.8% reported no prior history of alcohol consumption, 65.5% had no addiction issues, and 89.7% had no mental disorders. Most poisonings occurred in spring (27.1%), particularly in April (10.6%), at night (47.7%), and in the home (58.1%). Oral ingestion was the primary method (89.1%), with medications being the leading cause (53.3%). Methadone was the most hazardous substance, contributing to 18.8% of poisoning incidents. Patients typically arrived at the hospital within 30 to 60 minutes (62.3%) and stayed for 2 to 4 days (55.4%). Antidotes were needed for 41.4% of patients, with naloxone prescribed in 35.5% of cases. Following their recovery, 67.4% were discharged. Non-medicinal poisoning was most prevalent in children under five years of age and individuals over 46 years of age (P-value<0.001), while medicinal poisoning was more common in urban areas (P-value=0.003).*

Conclusions: *Studying the patterns of unintentional poisonings in a specific region can greatly enhance prevention and management strategies, ultimately saving lives. The results of this research enable healthcare providers to make informed clinical decisions and contribute to the development of practical guidelines for managing poisoning. By enhancing health and quality of life for individuals, this research undoubtedly reduces the financial burden on the healthcare system.*

Keywords: Epidemiological pattern, Unintentional poisoning, Teaching hospital.
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Introduction

Unintentional injuries have considerable economic effects on society and pose serious public health challenges, particularly affecting working-age individuals[1]. They rank as the third leading cause of death in Iran, primarily due to hazardous behaviors, and encompass injuries from falls, poisonings, accidents, and drownings[1, 2].

Poisoning, a leading cause of unintentional injuries, affects individuals of all demographics and can lead to lifelong disabilities that require ongoing medical care[3]. It occurs when harmful substances are absorbed into the body, resulting in toxic symptoms[4], and is a common reason for hospital emergency department visits[5]. Poisoning can be intentional or unintentional, with intentional poisonings in developing countries leading to many deaths due to high toxicity and limited medical resources[6].

Unintentional poisoning is a common reason for seeking help from the Australian Poisons Information Centre[7]. It occurs as a result of drug abuse, medication misuse, food, or carbon monoxide exposure. Contributing factors include daily accidents, occupational hazards, and substance abuse[8]. In these cases, a poisonous substance is usually ingested unknowingly[9].

Occupational poisoning occurs in industrial settings due to chemical exposure[10]. An overdose happens when a person takes more medication than needed. Abuse involves the improper use of illegal drugs or legal medications for non-therapeutic purposes, particularly for mood alteration[11]. The most important factors in substance abuse include pharmaceuticals such as tramadol and narcotics, as well as compounds such as opioids, Crack, and methamphetamine[12].

Over two-thirds of poisoning deaths are unintentional, with middle-aged males primarily affected by alcohol and opioids, while young men are often impacted by heroin and stimulants[13]. In 2019, the global mortality rate from unintentional poisoning was 1.10 per 100,000, with Iran reporting 1 per 100,000[14]. In 2020, the rate of unintentional overdose deaths among teenagers hit its highest level ever[15]. The Global Health Observatory reported unintentional poisoning mortality rates in 2021 as 0.8% for males and 0.4% for females[16]. A meta-analysis in Iran found that the prevalence of unintentional non-food poisoning was 53.8%[17]. The rapid industrialization and increased use of chemicals have contributed to a rise in unintentional poisonings globally, particularly in low- and middle-income countries due to

harmful household substances[18]. In 2022, 76.4% of all calls to U.S. poison control centers involved unintentional poisonings. While anyone can be affected, children under five and adults over sixty are the most vulnerable. Young children are at risk due to their curiosity, while older adults, especially those with cognitive impairments, may accidentally take too much medication[19].

Most poisonings are non-fatal but can lead to substantial economic and psychological harm[20]. The World Health Organization estimates that around 9 million poisonings occur globally each year, with a mortality rate of about 20%. No recent statistics on poisoning prevalence have been published in Iran[21].

In Canada, unintentional poisonings ranked among the top three causes of unintentional injury deaths from 2001 to 2007, affecting males more than females[22].

Between 1999 and 2016, U.S. unintentional poisoning mortality rates increased across demographics[23]. Recent decades have seen significant changes in patterns of acute poisoning due to advances in agriculture, pharmacology, and industrial technologies. In developed countries, household chemicals and prescription medications are the primary sources of poisoning, whereas in developing countries, agricultural chemicals, particularly pesticides, are the more significant contributors[24, 25]. Anticonvulsants, sedatives, and hypnotics are the leading causes of medicinal poisoning in Iran, with carbon monoxide and medication toxicity also being significant contributors[26]. Regional differences exist in poisoning events, with medications being the most common in several areas. While bites and stings are common in the south, pesticide poisonings are more common in northern agricultural areas. Inadequate ventilation of gas appliances is associated with increased carbon monoxide poisoning in urban areas, especially in Tehran during colder months[27].

Cultural and regional disparities within the country, coupled with the influence of environmental factors and the accessibility of toxic substances, have significantly contributed to the rising incidence of poisoning cases[28]. Furthermore, the patterns of poisoning observed in a country are determined by a multitude of factors, including the availability of diverse poisons and the social, economic, cultural, and religious beliefs prevalent within different communities[29]. Consequently, it is imperative to investigate the epidemiological patterns of poisoning across various regions of the country[30]. This study focuses on unintentional poisonings in patients at teaching hospitals in Shahroud during 2020-2022.

Materials and Methods

This cross-sectional descriptive study analysed the medical records of patients who experienced unintentional poisoning and received treatment at teaching hospitals in Shahroud. Data were gathered from the medical records of hospitalised patients covering the period from March 20, 2020, to March 20, 2022. All medical records of patients referred to Imam Hossein and Bahar hospitals with a diagnosis of unintentional poisoning were studied. Incomplete medical records were excluded from the study.

The research tool utilised was a checklist organised into two primary sections: demographic information and poisoning-related information. The demographic section captures details such as the patient's age, gender, marital status, occupation, education, and place of residence. The poisoning-related section addresses several critical aspects, including the type of poisoning agent involved, any history of alcohol consumption, substance abuse, and mental health disorders. Additionally, it records the season, month, day, and time of the poisoning incident, the location where it occurred, the individual's activities at the time of the poisoning, the method of transportation to the medical facility, the source of incident information, the time elapsed between the poisoning and medical referral, the treatment measures provided, and the duration of hospitalization.

This checklist was developed based on a review of the literature[31, 41, 45-49], and informed by the data registration form for trauma patients from the Deputy of Health at Shahroud University of Medical Sciences, which is affiliated with the Ministry of Health of Iran, as well as data from the National Trauma Registry of Iran.

The researchers established the checklist's content validity. Access to the research environment and the review of medical records commenced only after obtaining ethics approval from the university's research ethics committee and receiving an official letter of introduction from the university. The first author carefully reviewed the medical records to extract only the essential data. Statistical analysis of the data was conducted using descriptive statistics, including frequency distributions, in SPSS version 22.

Results

This study revealed that between March 20, 2020, and March 20, 2022, a total of 377 people were hospitalised due to unintentional poisoning. The mean age of the patients was 29.57 ± 22.96. The primary demographic affected by unintentional poisoning was males (65%), adults aged 46 or older(23.9%), single individuals (55.4%), and residents of urban areas (69.5%).

Table 1 illustrates that a significant majority of the individuals with unintentional poisoning had no prior history of alcohol consumption (92.8%), substance abuse (65.5%), or mental disorders (89.7%).

Table 1. Demographic characteristics of patients referred to the teaching hospitals in Shahroud

Variables		N*	%
Gender	Male	245	65
	Female	132	35
Age group	≤5	82	21.8
	6-15	35	9.3

	16-25	61	16.1
	26-35	63	16.7
	36-45	46	12.2
	≥46	90	23.9
Marital status	Single	209	55.4
	Married	168	44.6
Living area	urban	262	69.5
	Rural	115	30.5
Alcohol drinking	No	350	92.8
	Yes	27	7.2
History of addiction	No	247	65.5
	Yes	130	34.5
Mental disorders	No	338	89.7
	Yes	39	10.3

***: Number of patients.**

Table 2 shows that unintentional poisonings peaked in spring at 27.1%, with Farvardin (March 20 to April 19) accounting for 10.6% of cases alone. Most incidents (47.7%) ocurred at night, and 78.5% happened on non-holiday days.

Table 3 demonstrates that among patients referred to teaching hospitals in Shahroud, the predominant causes of unintentional poisoning were methadone, accounting for 18.8% of cases, and opium, which represented 17.2%.

Table 2. Characteristics of the time of unintentional poisoning

Variables		N	%
Season	Spring	102	27.1
	Summer	94	24.9
	Autumn	83	22
	Winter	98	26
Month	Farvardin (20 Mar-19 Apr)	40	10.6
	Ordibehesht (20 Apr- 20 May)	35	9.3
	Khordad (21 May-20 Jun)	34	9
	Tir (21 Jun-21 Jul)	34	9
	Mordad (22 Jul- 21 Aug)	32	8.5
	Shahrivar (22 Aug- 21 Sep)	31	8.2
	Mehr (22 Sep- 21 Oct)	31	8.2
	Aban (22 Oct- 20 Nov)	30	8
	Azar (21 Nov-20 Dec)	29	7.7
	Dey (21 Dec – 19 Jan)	28	7.4
	Bahman (20 Jan- 18 Feb)	27	7.2
	Esfand (19 Feb – 20 Mar)	26	6.9
Time	Morning	54	14.3
	Afternoon	67	17.8
	Evening	76	20.2
	Night	180	47.7
Days	Holiday	81	21.5
	Non-holiday	296	78.5

Table 3. Frequency of poisoning agents in patients referred to the teaching hospitals in Shahroud

Poisoning agents	N	%
Methadone	71	18.8
Opium	65	17.2
Unspecified substance	29	7.7
Alcohol	21	5.6
Petroleum products (gasoline, oil)	21	5.6
Tramadol	19	5
Methanol	13	3.4
Carbon monoxide	9	2.4
Organophosphates	8	2.1
Clonazepam	8	2.1
Acetaminophen	7	1.9

Alprazolam	7	1.9
Whitex	6	1.6
Buprenorphine	6	1.6
Depakine	4	1.1
Warfarin	4	1.1
Snake bites	4	1.1
Amphetamine	3	0.8
Vitamin D	3	0.8
Sodium valproate	3	0.8
Adult cold	3	0.8
Bee stings	3	0.8
Arthropod bites	2	0.5
Food	2	0.5
Opium + Ethanol	2	0.5
Plant	2	0.5
Baclofen	2	0.5
Carbamazepine	2	0.5
Gelofen	2	0.5
Propranolol	2	0.5
Metoclopramide	2	0.5
Montelukast	2	0.5
Opium + Alcohol	1	0.3
Unspecified acid	1	0.3
Chalk	1	0.3
Liquid detergent	1	0.3
Mercury	1	0.3
Methamphetamine	1	0.3
Methamphetamine + Tramadol	1	0.3
Oxidant	1	0.3
Cedar	1	0.3
Tramadol + Alcohol	1	0.3
Lead	1	0.3
Tinner	1	0.3
Alprozolam + Methadone	1	0.3
Amilodipine	1	0.3
Amoxicillin	1	0.3
Atenolol	1	0.3
Atenolol + Enalapril	1	0.3
Buprenorphine + Tramadol	1	0.3
Baclofen + tramadol	1	0.3
Clomipramine	1	0.3
Clonazepam + Methadone	1	0.3
Clonazepam + Depakine	1	0.3
Clonazepam + Trancopine	1	0.3
Diazepam	1	0.3
Digoxin	1	0.3
Famotidine	1	0.3
Glibenclamide	1	0.3
Insulin	1	0.3
Isotretinoin	1	0.3
Levebel	1	0.3
Levothyroxine	1	0.3
Novafen	1	0.3
Olanzapine + Haloperidol	1	0.3
Sildenafil	1	0.3
Sertraline + Clonazepam	1	0.3
Tramadol + Clonazepam	1	0.3
Tramadol + Sertraline	1	0.3
Zolpidem	1	0.3
Tricyclic antidepressants	1	0.3

Table 4 indicates that the majority of unintentional poisonings were related to digestive issues (89.1%) and medicinal substances (53.5%), with 58.1% occurring in a home setting. In 79.6% of these cases, the activities of the individuals at the time of poisoning were largely unspecified. Most patients (72.9%) were transported to hospital emergency departments by EMS 115. Companions of the patients served as the primary source of information about the incidents, accounting for

67.6%. The majority of patients (55.4%) spent 2 - 4 days in the hospital. Additionally, 62.3% of patients arrived at the hospital within 30 to 60 minutes after the onset of their poisoning symptoms. In most instances (58.6%), no antidote was administered; however, when an antidote was required, naloxone was the most frequently used (35.5%). Most patients (67.4%) were discharged after recovering and adhering to their physician's instructions.

Table 4. Characteristics of poisoning in patients referred to the teaching hospitals in Shahroud

Variables		N	%
Poisoning way	Digestive	336	89.1
	Inhalation	32	8.5
	Injection	9	2.4
Medicinal/non-medicinal poisoning	Medicinal	201	53.5
	Non-medicinal	176	46.7
The place of the Poisoning	Home	219	58.1
	Unspecified	121	32.1
	Public Area	27	7.2
	Other	6	1.6
	Industrial Area	3	0.8
	Street	1	0.3
The individual's activity at the time of the accident	Unspecified	300	79.6
	While engaged in leisure activity	37	9.8
	While resting, sleeping, eating or engaging in other vital activities	22	5.8
	While working for income	13	3.4
	Other	5	1.3
Transmit to medical center	EMS 115	275	72.9
	Family	102	27.1
Source of information about the incident	patient companion	255	67.6
	Patient	106	28.1
	EMS Technician	16	4.2
Length of stay	≤a day	91	24.1
	2 – 4 days	209	55.4
	5 – 7 days	38	10.1
	7 days>	39	10.3
Time interval from poisoning to referral to a medical center	30 min≥	142	37.7
	30 – 60 min	235	62.3
Receiving antidote	No received	221	58.6
	Naloxone	134	35.5
	Other	20	5.3
	Atropine	2	0.5
Hospital Discharge	Discharge with physician's order	254	67.4
	Discharge without physician's order	97	25.7
	Transfer to other hospital	13	3.4
	Death	13	3.4

Figure 1 illustrates a significant difference in poisoning patterns across different age demographics. Specifically, while medicinal poisonings predominated in most age groups, individuals aged 5 years and under, along with those aged 46 and older, showed markedly elevated rates of non-medicinal poisonings (P-value<0.001), highlighting the unique vulnerabilities present in these age cohorts.

Figure 2 illustrates a notable disparity in poisoning incidence by geographical location. Specifically, the data indicate a higher prevalence of medicinal poisoning in urban areas, whereas rural areas exhibited a greater frequency of non-medicinal poisoning (P-value=0.003).

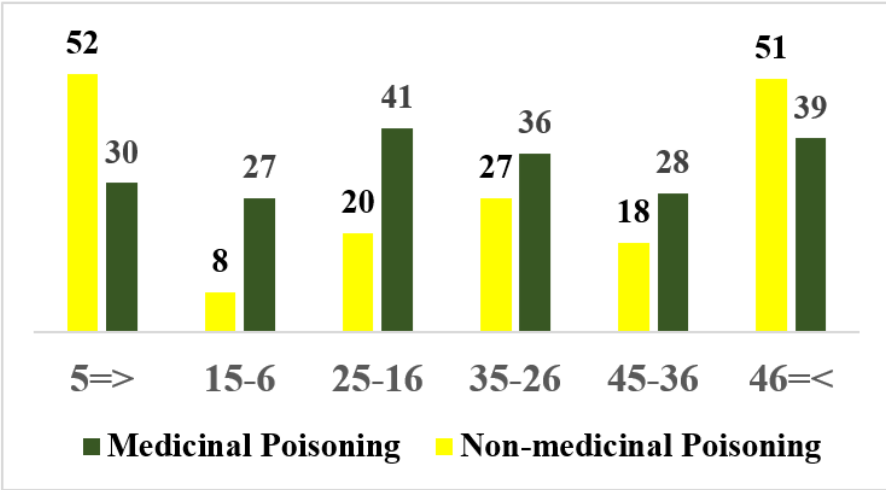

Figure 1. The frequency of medicinal and non-medicinal poisoning across different age-groups

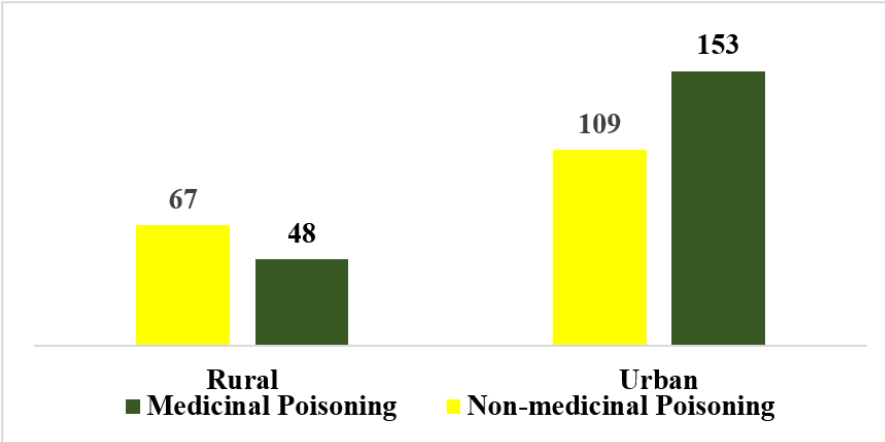

Figure 2. Medicinal and non-medicinal poisoning based on the living area

Discussion

The study was aimed at determining the patterns of unintentional poisonings among patients referred to the teaching hospitals in Shahroud. The findings showed that unintentional poisoning predominantly occurs in adults aged 46 and older. Different studies identify different age groups at risk, with the highest proportions reported in the 36 – 59 age group[31], the 19–24 age group[32], the 21–30 age group[33], the 20–30 age group[34], and the 21–35 age group[35] across different regions in Iran. Given the variation in age demographics associated with unintentional poisoning, caution is warranted when comparing and interpreting these findings. Our findings also revealed that children aged five or younger were the second most susceptible group for unintentional poisoning. Annually, it is estimated that more than 100,000 deaths are attributable to unintentional poisoning, with a significant incidence observed in children under the age of five[36]. Childhood poisoning is a major global health issue[37] and is a common reason for emergency hospital visits in many countries, accounting for around 1% of annual pediatric hospitalizations[5]. In this line, a study by Momayyezi et al. revealed that most poisonings happen in children under 5 years old, with the highest incidence occurring in those younger than one year[38]. Previous research indicates that pediatric poisoning commonly occurs during the onset of mobility and oral object exploration[39]; consequently, such instances are avoided by careful parental supervision and appropriate pharmaceutical storage[38].

The literature indicates that men are the most vulnerable demographic when it comes to poisoning[8, 17, 27, 31, 40-43], which aligns with our findings. Increased rates of unintentional poisoning in men are linked to substance and drug abuse[40], supported by research correlating male behavior with these adverse outcomes[44-46]. Pilehvar et al. identified unintentional accidents as the primary cause of mortality differences between men and women in North Khorasan Province, noting that these incidents occur more frequently among men[47]. Nevertheless,

some studies suggest that poisoning is more common in women[32, 33]. Additionally, a study by Masoumi et al.[32] showed that the most significant prevalence of intentional poisoning is among married homemakers.

The literature[31, 33, 35, 48, 49] indicates that poisoning prevalence is highest among single individuals, which confirms our finding. Shojaei Baghini et al. suggest that increased poisoning among single individuals may be linked to weak emotional connections and family cohesion, indicating a need for further research into psychosocial factors[34]. Research by Moller et al.[50] found that single adults have higher rates of poisoning, hinting at a protective effect of marriage. However, this may not account for gender differences since women often outlive their partners. In contrast to our findings, Masoumi et al.[32] reported that more than half of poisoning cases occurred among married individuals. They highlight a significant rise in both unintentional and intentional poisonings among married individuals, particularly women, which may be associated with family conflicts and dissatisfaction with life. This argument is further supported by Farabi et al.[51]and Torkashvand et al.'s findings, which highlighted that intentional poisoning rates are higher among divorced and widowed individuals than among those who are single or married. This increase may be associated with heightened psychological stressors and challenges resulting from family disintegration, which could serve as contributing factors to suicide attempts[48].

Research demonstrates that higher rates of poisoning occur among unemployed individuals, attributable to various psychosocial stressors. For instance, Shojaei Baghini et al. reported that self-employment and an elevated risk of intentional poisoning and suicide attempts are interlinked, primarily due to economic instability[34]. Furthermore, a study conducted by Dadpour et al. observed that stable employment serves as a protective factor against suicide attempts[52]. It is worth noting that the lack of occupational information for the patients under review limited our ability to compare poisoning rates across occupational groups.

The literature[31, 34, 35, 38, 41, 48, 53] indicates that most individuals affected by unintentional poisoning lived in urban areas, supporting our finding. Research[31, 33] suggests that industrial and economic development, coupled with psychological challenges and increased access to substances, has resulted in higher poisoning rates in urban areas compared to rural ones.

Most individuals with unintentional poisoning had no prior history of alcohol use, addiction, or mental disorders. In contrast to our finding, Mohammad Hosseini et al. noted that poisoned individuals displayed symptoms of depression[33]. Torkashvand et al. indicated that incidents of intentional poisoning were more prevalent among individuals with a history of prior poisoning, the presence of psychiatric disorders, and the utilization of psychiatric medications. In contrast, occurrences of accidental poisoning and drug overdoses were reported to be less frequent[48]. It may suggest that individuals with such histories may be at an increased risk for adverse health outcomes related to poisoning incidents.

The literature[31, 34, 54-56] indicates that the highest rate of poisoning occurred in spring, which supports our finding. Seasonal variations and heightened energy levels may contribute to increased substance abuse in this season[56]. Despite inconsistent findings on the seasonal patterns of poisoning[54], the literature[35, 53, 57, 58] indicates that poisoning prevalence peaks in summer. Therefore, healthcare professionals must be ready to address seasonal variations in poisoning risks. Specifically, winter is associated with a higher incidence of carbon monoxide poisoning, while summer and rural areas experience increased cases of snakebites and agricultural chemical exposure[59].

Research findings[31, 33] indicate that the highest incidence of poisoning occurs at night, which supports our finding. Conversely, other studies[32, 41] show that the peak incidence of poisoning occurs during the daytime. Given the variability in timing of these poisonings, it is essential to exercise caution when comparing and interpreting these findings.

The literature[34, 51, 60] shows that methadone is a significant agent of poisoning, which is consistent with our finding. Methadone is primarily employed in the treatment of opioid dependence and in the management of chronic pain conditions. In Iran, methadone is available in syrup form (5 mg per dose) and as tablets with concentrations of 5 mg, 20 mg, and 40 mg/mL. In contrast, in the U.S. and Europe, methadone syrup is offered at a lower concentration of 1 mg/mL. This difference in formulation may contribute to increased rates of severe poisoning incidents within pediatric populations in these areas[61]. The rising prevalence of methadone usage raises concerns about Methadone Maintenance Treatment (MMT), particularly because many individuals exhibit a lack of understanding about methadone's pharmacokinetics. This knowledge gap leads to indiscriminate use and the risk of exceeding recommended dosages, posing serious health risks. Moreover, the availability of methadone within the home environment increases the risk of unintentional consumption by children and other family members, contributing to a notable increase in cases of unintentional methadone poisoning[62].

Ayubi et al.[55] conducted a systematic review showing that accidental methadone ingestion is the leading cause of unintentional poisoning in infants. The findings suggest that this issue can be mitigated through parental education on addiction and its related risks. Giahchin et al.[60] reported that ingestion of methadone is linked to the highest rate of fatal oral poisoning. This finding highlights the need for strict regulation.

Our findings showed that opium was identified as the second leading cause of unintentional poisoning. A study conducted by Shokrzadeh et al. indicated that opium and its derivatives, along with Crack, represent the primary contributors to unintentional poisoning-related deaths[63]. Similarly, Payvar et al.[56] identified that, after pharmaceuticals, opium (including opium and syrup) is the leading cause of poisoning among individuals under the age of 10 and over 50 in the northeastern region of the country. Drugs, particularly opium, heroin, and methadone, are identified as the leading cause of non-medicinal poisonings according to a study by Nasiri et al.[53]. Research by Mohammadi et al. highlights that opioid, narcotic, and tramadol abuse leads to unintentional poisonings[43]. Additionally, Shokarzadeh et al. emphasize that substance abuse, mainly involving opium and its derivatives, is responsible for most unintentional poisoning incidents[40].

The literature[40, 48] indicates poisoning can occur through

various routes of entry, including inhalation, injection, and dermal absorption. However, the predominant route of poisoning involves either intentional or unintentional ingestion of agents of poisoning[31, 33, 41, 48, 64, 65], which supports our finding. Oral poisoning remains a prevalent form of poisoning[66] and significantly contributes to global morbidity and mortality rates[36]. Research findings[40, 48] indicate that medicinal poisoning represents the primary type of unintentional poisonings, which supports our finding. Medicinal poisoning has been increasing recently. The Centers for Disease Control and Prevention (CDC) reports that medicinal poisoning has overtaken motor vehicle accidents as the primary cause of injury-related mortality[67]. Taking too much medicine, whether intentional or unintentional, is a critical global public health challenge that impacts individuals, families, healthcare systems, and society at large. Hence, a comprehensive understanding of its epidemiology is essential for the development of effective preventive strategies, therapeutic interventions, and policy initiatives aimed at mitigating the impact of medicinal poisoning and enhancing public health outcomes[68-70].

Research findings[32, 55] indicate that most unintentional poisonings occurred at home, which confirms our finding. Complying with safety protocols at home is an effective strategy to reduce the occurrence of this adverse outcome[55]. Many studies on the epidemiological characteristics of poisonings, particularly unintentional ones, have highlighted a lack of documented locations. However, the findings of this study, along with those of the systematic review by Ayubi et al.[55], indicate that general community education is an effective preventive measure for reducing the incidence of poisoning.

Our findings suggest that, in the majority of cases, the activities individuals were engaged in at the time of the incident were not documented. Consequently, this lack of information poses significant challenges in conducting a precise analysis of the issue at hand.

Our findings indicated that a time interval of 30 minutes to 1 hour elapsed between the occurrence of unintentional poisoning and referral to a medical facility. Research by Jafarzadeh et al. demonstrated that most patients, whether the poisoning was intentional or unintentional, arrived at the hospital within 1 hour of symptom onset. This observation suggests that timely access to medical care may significantly reduce complications[31]. Furthermore, Masoumi et al. reported that most individuals sought medical care within 3 hours of symptom onset, thereby highlighting the importance of prompt transfer to medical institutions for improved patient outcomes and survival rates[32]. Our findings show that patients' companion were the primary source of information about the incident. Given the patient's altered consciousness and the unusual aspects of their condition, taking a medical history from their companion may be necessary. Since most poisonings occur at home, family members often serve as the primary informants, though there are instances where critical information may be concealed or withheld. A study by Zhang et al. indicates that companions play a vital role in facilitating patient information exchange[71], significantly contributing to the quality of communication within healthcare environments.

Our study revealed that most patients with unintentional poisoning were hospitalized for a period of 2 to 4 days. In contrast, research by Masoumi et al.[32], and Torkashvand et al.[48] indicates that most patients were hospitalized for less than 24 hours. Furthermore, earlier research[32, 33, 40] indicates that most patients were discharged home on their physician's advice, which supports our findings. In contrast, Nasiri et al. study[53] suggests that most patients poisoned in the pre-hospital emergency department of Ghaemshahr were transferred to more advanced medical facilities for further care after receiving essential treatment. The discharge status results from timely referrals, appropriate treatment and care, and the low severity of the poisoning.

This study focused on unintentional poisonings among patients in Shahroud, limiting the generalizability of the findings to Iran. Results should be interpreted cautiously, as they are based on 2 years of data and lack historical comparisons due to limited prior research in the city. A significant challenge in understanding the epidemiological patterns of unintentional poisoning is the limited documentation of patients' occupations and educational levels. This lack of data hinders comparative analyses of poisoning rates across different demographic groups.

The findings of the study indicated that the most at-risk groups for poisoning include men, single individuals, and those over the age of 46. The primary agents of poisoning involved were methadone and narcotics, highlighting the urgent need for public education, particularly aimed at middle-aged individuals, regarding the dangers of non-prescription drug use and proper medication practices. Unintentional poisonings serve as significant indicators for relevant authorities and stakeholders in this area; thus, it is advisable to conduct further research to enhance understanding and prevention efforts.

Ethical Considerations

The study was approved by the ethics committee of Shahroud University of Medical Sciences (IR.SHMU.REC.1401.156) and was supported by the Shahroud University of Medical Sciences.

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Conflict of Interest

The authors declare that they have no competing interests.

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References

1. H. Kettunen, et al. Trends of fatal unintentional injuries among working-age adults in Finland between 1998 and 2022. Injury 2025;56:112030. doi: 10.1016/j.injury.2024.112030

2. M. Sasanipour, A. Khosravi and M. Moheby Meymandi. Study of share of unintentional accidents in sex differences of mortality in Iran, 2006-2015. Iranian Journal of Epidemiology 2022;17:320-9.

3. Y. Tang, et al. Unintentional poisoning in China, 199 0 to 2015: the global burden of disease study 2015. American Journal of Public Health 2017;107:1311-5. doi: 10.2105/AJPH.2017.303841

4. E. Mert and N. G. Bilgin. Demographical, aetiological and clinical characteristics of poisonings in Mersin, Turkey. Human & Experimental Toxicology 2006;25:217-23. doi: 10.1191/0960327106ht612oa

5. H.-L. Lee, H.-J. Lin, S.-Y. Yeh, C.-H. Chi and H.-R. Guo. Etiology and outcome of patients presenting for poisoning to the emergency department in Taiwan: a prospective study. Human & Experimental Toxicology 2008;27:373-9. doi: 10.1177/0960327108094609

6. M. Haresabadi, M. Sedaghat, M. Vejdani, S. Ahrari, N. Toghian CHaharsougi and A. Momeni. Epidemiologic study of acute poisoning in children aged under 12 years referred to Imam Reza hospital, 2010-2012. North Khorasan University of Medical Sciences 2013;5:47-52. doi: 10.29252/jnkums.5.1.47

7. Q. X. Koh, S. Wise, J. E. Raubenheimer, D. Debono, D. M. Roberts and J. E. Carland. Unintentional poisoning in older Australians: a retrospective audit of New South Wales poisons information centre data. Clinical toxicology (Philadelphia, Pa) 2024;62:625-35. doi: 10.1080/15563650.2024.2398766

8. L. Fazel Tolami and S. Maleki Ziabari. Study of variety of toxicity in the poisoned cases rescued by emergency medical sciences center in guilan. Journal of Guilan University of Medical Sciences 2012;21:77-82.

9. M. Lipnik-Štangelj. Hospitalizations due to poisonings in Slovenia-epidemiological aspects. Wiener klinische Wochenschrift 2010;122:54-8. doi: 10.1007/s00508-010-1338-9

10. P. L. Williams and J. L. Burson. Industrial Toxicology: Safety and Health Applications in the Workplace: Lifetime Learning Publications; 1985.

11. N. Al-Jaser, M. C. Epi and N. Awofeso. Epidemiology of patients diagnosed with prescription and non-prescription drug overdose at the Riyadh Security Forces Hospital between January 2007 and December 2011. Current topics in public health: IntechOpen; 2013. doi: 10.5772/52879

12. M. Barati, H. Allahverdipour and F. Jalilian. Prevalence and predictive factors of psychoactive and hallucinogenic substance abuse among college students. Journal of Fundamentals of Mental Health 2011;13:83-374.

13. A. Chrzanowska, et al. Unintentional and intentional drug poisoning deaths, Australia, 2012-2016: Drug pattern profile and demographic characteristics. Drug and Alcohol Dependence 2021;229:109112. doi: 10.1016/j.drugalcdep.2021.109112

14. World Health Organization - processed by Our World in Data. "Death rate from unintentional poisoning" [dataset]. Global Health Estimates 2019: Deaths by Cause, Age, Sex, by Country and by Region, 2000-201: Geneva, World Health Organization, 2020; 2020 [cited 2025 May 24, 2025].

15. S. P. Hermans, J. Samiec, A. Golec, C. Trimble, J. Teater and O. T. Hall. Years of life lost to unintentional drug overdose rapidly rising in the adolescent population, 2016-2020. The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine 2023;72:397-403. doi: 10.1016/j.jadohealth.2022.07.004

16. World Bank Group - Gender Data Portal. Mortality rate attributed to unintentional poisoning (per 100,000 population) 2021.

17. P. Bagheri and Sepand M.R. A meta analytical study of intentional and accidental non-food poisoning incidences in Iran (1991-2013). Koomesh 2015;16:443-53.

18. S. Meyer, M. Eddleston, B. Bailey, H. Desel, S. Gottschling and L. Gortner. Unintentional household poisoning in children. Klinische Padiatrie 2007;219:254-70. doi: 10.1055/s-2007-972567

19. K. Lieu and K. T. LeSaint. What Is Accidental Poisoning? JAMA 2024;332:2046-. doi: 10.1001/jama.2024.17485

20. S. A. Tabibzadeh, R. Yazdani, S. Zare, J. Golmirzaei, S. M. Solati and B. Tavousi Tehrani. Epidemiologic study of poisonings in patients reffering to emergency ward of Shahid Mohammadi university hospital in Bandar Abbas. Hormozgan Medical Journal 2014;18:313-22.

21. S. Shadnia, H. Esmaily, G. Sasanian, A. Pajoumand, H. Hassanian-Moghaddam and M. Abdollahi. Pattern of acute poisoning in Tehran-Iran in 2003. Human & Experimental Toxicology 2007;26:753-6. doi: 10.1177/0960327107083017

22. Y. Chen, F. Mo, Q. L. Yi, Y. Jiang and Y. Mao. Unintentional injury mortality and external causes in Canada from 2001 to 2007. Chronic Diseases and Injuries in Canada 2013;33:95-102. doi: 10.24095/hpcdp.33.2.06

23. C. J. Cherpitel, Y. Ye and W. C. Kerr. Shifting patterns of disparities in unintentional injury mortality rates in the United States, 1999-2016. Revista Panamericana de Salud Publica=Pan American Journal of Public Health 2021;45:e36. doi: 10.26633/RPSP.2021.36

24. S. Jailkhani, J. Naik, M. Thakur, S. Langare and V. Pandey. Retrospective analysis of poisoning cases admitted in a tertiary care hospital. Int J Recent Trends Sci Technol 2014;10:365-8.

25. E. Lynn, A. Doyle, M. Keane, K. Bennett and G. Cousins. Drug poisoning deaths among women: a scoping review. Journal of Studies on Alcohol and Drugs 2020;81:543-55. doi: 10.15288/jsad.2020.81.543

26. M. Moradi, K. Ghaemi and O. Mehrpour. A hospital base epidemiology and pattern of acute adult poisoning across Iran: a systematic review. Electronic Physician 2016;8:2860. doi: 10.19082/2860

27. S. Alinejad, N. Zamani, M. Abdollahi and O. Mehrpour. A narrative review of acute adult poisoning in Iran. Iranian Journal of Medical Sciences 2017;42:327-46.

28. S. Mosavi, M. Vazirianzadeh, S. Moravvej, M. Hossienzadeh and B. Vazirianzadeh. An epidemiological study on scorpion stings in Lordegan county, south-west of Iran. Archives of Razi Institute 2013;68:71-6.

29. A. Jalali, M. Savari, S. Dehdardargahi and A. Azarpanah. The pattern of poisoning in southwestern region of Iran: envenoming as the major cause. Jundishapur Journal of Natural Pharmaceutical Products 2012;7:100-5. doi: 10.17795/jjnpp-3504

30. Z. A. E. Abd-Elhaleem and B. Al Muqhem. Pattern of acute poisoning in Al Majmaah region, Saudi Arabia. American Journal of Clinical and Experimental Medicine 2014;2:79-85.

31. S. Jafarzadeh, Z. khiyali, s. Safdar, F. Mobasheri and Z. Malaki. Characteristics of hospitalized patients due to intentional and unintentional poisoning in Fasa city, 2014-2016. Iranian Journal of Emergency Care 2017;1:9-18.

32. G. Masoumi, et al. Evaluating the prevalence of intentional and unintentional poisoning in vulnerable patients admitted to a Referral Hospital. Journal of Isfahan Medical School 2013;31:1452-60.

33. S. Mohammad Hosseini, Z. Karimi, A. Afrasiyabifar, E. Naeimi, M. Moghimi and S. Sadat. Causes of acute poisoning hospital admission in shahid beheshti hospital of yasuj, 2008. Armaghane Danesh 2012;17:263-71.

34. M. Shojaei Baghini, T. NaseriBooriAbadi, M. Rastgoo, M. Poornakhaei and A. Mohammadpour. Epidemiology of poisoning in patients admitted to Afzalipour teaching hospital in Kerman, Iran. Iranian Journal of Epidemiology 2022;18:91-103.

35. S. Jalilifard, M. R. Abyaz and N. Asadmasjedi. Epidemiological study of various poisonings in patients referred to Dezful general hospital, Ahvaz, Iran. 2022.

36. B. Avau, V. Borra, A. C. Vanhove, P. Vandekerckhove, P. De Paepe and E. De Buck. First aid interventions by laypeople for acute oral poisoning. The Cochrane Database Of Systematic Reviews 2018;12:Cd013230. doi: 10.1002/14651858.CD013230

37. T. Lamireau, et al. Epidemiology of poisoning in children: a 7-year survey in a paediatric emergency care unit. European Journal of Emergency Medicine 2002;9:9-14. doi: 10.1097/00063110-200203000-00004

38. M. Momayyezi, P. Peigan and H. Fallahzadeh. Epidemiological pattern of poisoning in children under the age of 15 admitted to the referral teaching hospitals of Yazd and Taft cities (2014-2019). Journal of Environmental Health and Sustainable Development 2021;6:1357-66. doi: 10.18502/jehsd.v6i3.7243

39. G. C. Rodgers. Jr and Nancy J. matyunas Poisoning. Epidemiology and approach to management in Nelson, Textbook of pediatrics 17th ed: Saunders 2004:2362-3.

40. M. Shokrzadeh, J. Jalilian, R. Hoseinpoor, A. Hajimohammadi, A. Delaram and Y. Shayeste. Prevalence and causes of unintentional poisonings in patients admitted to the 5Azar Hospital of Gorgan, during 2008 - 2015. Beyhagh 2017;21:1-11.

41. J. Rezaei Orimi, E. Nasiri, P. Talebi and G. Mahmodpoor. Investigating the unintentional poisoning epidemiology in prehospital emergency center in Qaemshahr City, Iran. Health in Emergencies and Disasters Quarterly 2023;8:115-24. doi: 10.32598/hdq.8.2.433.1

42. B. Mesgarpour, et al. Age- and gender-specific acute poisoning with drugs and medications affecting nervous system. BMC pharmacology & toxicology 2024;25:37. doi: 10.1186/s40360-024-00759-1

43. J. Mohamadi, F. Niyazmand and S. M. Maleki Ziabari. Epidemiological investigation of poisoning cases assisted by guilan province 115 emergency.

Journal of Guilan University of Medical Sciences 2016;25:56-60.

44. K. Dehghani, A. Zare, H. Dehghani, H. Sedghi and Z. Poormovahed. Drug abuse prevalence and risk factors in students of Shaheed Sadoughi University of Medical Sciences, Yazd. The Journal of Shahid Sadoughi University of Medical Sciences 2010;18:164-9.

45. K. Hajian, F. Khirkhah and M. Falatoni. Epidemiology of addiction among volunteered addicts attending in detoxification centers. Journal of Guilan University of Medical Sciences 2013;22:22-30.

46. A. Seragi, H. Momeni and A. Salehi. Investigation of factors on tendency to narcotic agents and to stability abandon in Narcotics Anonymous in Khomain. Journal of Arak University of Medical Sciences 2010;13:68-75.

47. A. A. Pilehvar, R. Feizabadi and H. Afra. Effective etiology and geographic distribution of deaths in North Khorasan Province. Journal of Geography and Regional Development 2013;10:119-41.

48. F. Torkashvand, M. Sheikh Fathollahi, S. Shamsi, M. Kamali and M. Rezaeian. Evaluating the pattern of acute poisoning in cases referred to the emergency department of Ali-ebn Abi Taleb Hospital of Rafsanjan from October 2013 to September 2014. Journal of Rafsanjan University of Medical Sciences 2015;14:311-24.

49. M. Aryaie, R. Dokoohaki, A. Rezaeian Mehrabadi and F. Bakhsha. Epidemiological study of poisoning in teaching hospitals in Shiraz in 1387. Alborz University Medical Journal 2012;1:71-6. doi: 10.18869/acadpub.aums.1.2.71

50. J. Möller, E. Lindholm, P. Fredlund, M. Vaez, Y. Liang and L. Laflamme. Trends in intentional and unintentional poisonings among older adults - A national register-based study in Sweden. BMC Geriatrics 2023;23:296. doi: 10.1186/s12877-023-03973-4

51. R. Farabi, A. Javan-Molaei, E. Farzaneh, S. Sadeghieh Ahari and S. Mostafalou. A survey on the epidemiology of acute poisoning in adults referring to Imam Khomeini Hospital in Ardabil during 2017-2020. Journal of Ardabil University of Medical Sciences 2024;24:196-209. doi: 10.61186/jarums.24.2.196

52. B. Dadpour, F. Madani Sani, M. Rahimi Doab, A. Gerami, P. Rajaei and M. Talebi. Factors related in suicide attempts in admitted poisoned patients. Journal of Patient Safety & Quality Improvement 2015;3:247-51.

53. E. Nasiri, P. Talebi, Q. Mahmoudpour and J. Rezaei Orimi. Epidemiology study on poisoning in patients received pre-hospital emergency services in Ghaemshahr, Iran. Journal of Guilan University of Medical Sciences 2021;30:28-39. doi: 10.32598/JGUMS.30.1.1

54. G. Mehdizadeh, A. Manouchehri, A. Zarghami and A. Moghadamnia. Prevalence and causes of poisoning in patients admitted to Shahid Beheshti Hospital of Babol in 2011-2012. Journal of Babol University of Medical Sciences 2015;17:22-8.

55. E. Ayubi, et al. Population attributable risk of unintentional poisoning in Iranian children. Journal of Pediatric Perspectives 2016;4:1655-62.

56. B. Payvar, H. Hashemizadeh, M. Siavoshi and A. Hamedi. Studying pattern of Acute Poisoning in north- eastern Iran. Medical Journal of Mashhad university of Medical Sciences 2021;64:3889-901.

57. A. Baydin, T. Yardan, D. Aygun, Z. Doganay, C. Nargis and O. Incealtin. Retrospective evaluation of emergency service patients with poisoning: a 3-year study. Advances in Therapy 2005;22:650-8. doi: 10.1007/BF02849959

58. A. A. Moghadamnia and M. Abdollahi. An epidemiological study of poisoning in northern Islamic Republic of Iran. Eastern Mediterranean Health Journal 2002;8:88-94. doi: 10.26719/2002.8.1.88

59. F. Rezaee, A. Emami Zeydi, H. Darvishi-Khezri and H. Jafari. Factors associated with incidence and severity of acute poisoning in aged people: a retrospective cross-sectional study in north of Iran, 2013-2020. Journal of Mazandaran University of Medical Sciences 2022;32:163-8.

60. L. Giahchin, S. K. Fotouhi, R. Karimi and M. Hojati. Investigation mortality rates due to substance abuse poisoning referred to the forensic medicine of Isfahan Province in 2022. Iranian Journal of Forensic Medicine 2024;30:113-9.

61. Y. Allameh, F. S. Akrami, G. Mohammadi, N. Molavi and M. Babakhanian. Methadone poisoning in children: a systematic review and meta-analysis in Iran. Journal of Pediatrics Review 2017;5:1-8. doi: 10.5812/jpr.10133

62. A. Yaraghi, A. S. Talaei-Zavareh, M. Mansourian and N. Eizadi-Mood. Naltrexone in unintentional methadone poisoning. Journal of Isfahan Medical School 2016;34:580-8.

63. M. Shokrzadeh and S. Yaghubi beklar. Epidemiology of drug-poisoning death in central cities of Mazandaran, Iran 2011-2016. Journal of Mazandaran University of Medical Sciences 2017;27:140-5.

64. J. B. Mowry, D. A. Spyker, D. E. Brooks, A. Zimmerman and J. L. Schauben. 2015 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 33rd Annual Report. Clinical toxicology (Philadelphia, Pa) 2016;54:924-1109. doi: 10.1080/15563650.2016.1245421

65. L. Chelkeba, A. Mulatu, D. Feyissa, F. Bekele and B. T. Tesfaye. Patterns and epidemiology of acute poisoning in Ethiopia: systematic review of observational studies. Archives of public health 2018;76:34. doi: 10.1186/s13690-018-0275-3

66. E. Nasiri, J. Rezaei Orimi, M. Moallemi and S. Padashi. Evaluation, diagnosis and treatment of oral poisoning in four Persian medical texts. Journal of Islamic and Iranian Traditional Medicine 2021;11:381-400.

67. A. Heydarian and B. N. F. Azar. Drug poisoning: focus on epidemiology, diagnostic methods, management and treatment: a scoping review. Eurasian Journal of Chemical, Medicinal and Petroleum Research 2024;3:236-46.

68. B. A. Kiasari, et al. Combination therapy with nivolumab (anti-PD-1 monoclonal antibody): a new era in tumor immunotherapy. International Immunopharmacology 2022;113:109365. doi: 10.1016/j.intimp.2022.109365

69. B. Ramazanzadeh, F. Ahrari and B. Sabzevari. The effect of activation value on load-deflection properties of new and recycled nickel-titanium arch wires. Journal of Dentistry 2011;12:184-94.

70. B.-A. Ramazanzadeh, F. Ahrari, B. Sabzevari, S. M. Zebarjad and A. Ahrari. Effects of a simulated oral environment and sterilization on load-deflection properties of superelastic nickel titanium-based orthodontic wires. International Journal of Orthodontics Milwaukee Wis 2011;22:13-21.

71. X. Zhang and Y. Wu. Roles and contributions of companions in healthcare professional-older patient interaction: A systematic review. Patient Education and Counseling 2025;130:108455. doi: 10.1016/j.pec.2024.108455