

## A Study of Toxicification Types in Intubated Poisoned Patients in the ICUs of Taft Shahid Beheshti and Yazd Shahvali Hospitals (2015–2019)

Ghonghe Omid Shafiee<sup>1</sup>, Hamid Owliaey<sup>2,\*</sup>, Sareh Rafat Moghadam<sup>3</sup>, Shadi Talebi<sup>1</sup>, Hamidreza Ghasemirad<sup>4</sup>, Marjan Shariatpanahi<sup>1</sup>, Forouzan Farez<sup>1</sup>, Faezeh Niknam<sup>5</sup>, Mehrnoush Giahhi Yazdi<sup>6</sup>

1. Department of Medical Sciences, Yazd Branch, Islamic Azad University, Yazd, Iran
2. Department of Forensic Medicine & Clinical Toxicology, Yazd Branch, Islamic Azad University, Yazd, Iran
3. Department of Internal medicine, Fasa University of Medical Sciences, Fasa, Iran
4. Student Research Committee, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
5. Department of Internal medicine, Faculty of medicine, Shahid Sadoughi University of Medical Sciences and Health Service, Yazd, Iran
6. General Practitioner, Social security organization of Yazd, Iran

\* **Corresponding author:** Hamid Owliaey, Department of Forensic Medicine & Clinical Toxicology, Yazd Branch, Islamic Azad University, Yazd, Iran. Email: Owliaeyhamid2023@gmail.com

Received 2024 March 08; Accepted 2024 December 25.

### Abstract

**Background:** Although poisoning is one of the most common reasons for visits to emergency departments, the types of toxicification among intubated poisoned patients in ICUs have not been well documented.

**Objectives:** This study aimed to identify the toxicification types among intubated poisoned patients in an intensive care unit (ICU).

**Methods:** This retrospective cross-sectional study was conducted on poisoned patients with chemical compounds, hospitalized in ICU, and underwent endotracheal intubation. Toxicological and clinical factors, as well as outcomes, were collected and analyzed. Analysis was performed using the Chi-square test and Fisher's exact test. The p-value < 0.05 was considered significant.

**Results:** In this study, 307 patients with the diagnosis of poisoning were evaluated. The most common toxic agents were methadone (46.8%), opium (5.9%), organophosphorus compounds (5.9%), methanol (4.2%), and other chemical substances (2.4%). A single compound poisoned most patients (70%). Furthermore, 167 patients (54.4%) experienced accidental poisoning or drug abuse, while the remaining cases (45.6%) were due to suicidal intentions. Significant differences were observed between these two groups (suicidal and accidental poisoning groups) regarding age, gender, types of toxicification, and grouping and duration of ICU hospitalization ( $P < 0.05$ ). Significant differences were found in patient outcomes based on toxicification types, toxicification type grouping, or ICU hospitalization duration ( $P < 0.05$ ).

**Conclusion:** Our results indicate that opioids, especially methadone, were the most frequent cause of poisoning in our study. Pesticide poisoning occurred significantly more often in patients with suicidal intent. Additionally, patient outcomes were significantly influenced by age, gender, type, grouping of toxic agents, and duration of ICU hospitalization.

**Keywords:** Endotracheal intubation, Intensive care unit (ICU), Mortality, Poisoning.

### 1. Background

Poisoning is a leading cause of emergency department (ED) visits and intensive care unit

(ICU) admissions worldwide, posing a significant public health challenge, especially in developing countries (1–7). Globally, over one million poisoning cases are reported annually,

contributing substantially to morbidity and mortality (8). In Iran, poisoning represents the most common method of fatal self-harm, accounting for nearly 60% of suicide-related deaths (9) and constitutes approximately 15–20% of all ED visits (10–12). The proportion of patients with acute intoxication presenting to EDs varies widely, ranging from 3.7% to 40% (1–3). Similarly, depending on the healthcare setting and ICU type, patients with acute poisoning constitute between 3.4% and 13.8% of ICU admissions (4, 5). According to the World Health Organization, pesticide poisoning alone causes over 200,000 deaths annually, with mortality rates reaching up to 20% in certain regions (8).

Additionally, drug overdose remains a significant medical challenge, often requiring ICU admission and extensive healthcare resources (13). The rising incidence of opioid overdoses—including prescription opioids, synthetic variants, and heroin—poses an increasing challenge for critical care providers who must manage more complex cases (14). Among opioids, methadone poisoning, a synthetic opioid with a long-acting effect, has also seen a notable increase in our country (15). Clinical outcomes among poisoned patients depend on multiple factors, including the type and dose of the toxic agent, duration of exposure, and the patient's baseline health status. Early recognition and prompt supportive care are essential to improving survival rates (16). Severe cases often present with impaired consciousness or respiratory failure, necessitating endotracheal intubation to protect the airway and prevent aspiration (17–19). Other indications for intubation include seizures, severe agitation, or depressed respiratory drive resulting from toxic exposure (20–25). Despite the clinical significance, there is a paucity of data on the patterns of poisoning and outcomes among intubated patients in Iranian hospitals. Moreover, there is no comprehensive study in this regard in our province. Therefore, this study aims to characterize the types of toxins

involved in poisoned patients who required endotracheal intubation in the ICUs of Shahid Beheshti Hospital in Taft and Shah-Vali Hospital in Yazd between 2015 and 2019.

## 2. Objective

This retrospective cross-sectional study was conducted in the Department of Poisons at Taft Shahid Beheshti and Yazd Shahvali hospitals, the centers of Iran, from January 2015 to March 2019. The types of toxification in patients who underwent endotracheal intubation were measured. Inclusion criteria consisted of patients in all age groups referred to the poisoning Department with poisoning of the chemical compound, hospitalized in an intensive care unit (ICU), and underwent endotracheal intubation. Exclusion criteria consisted of patients with incomplete or inadequate medical records. The study flowchart is shown in [Figure 1](#).

A toxicologist confirmed the diagnosis of chemical compound poisoning.

Then, various variables including the patient's age, type of drug which led to the poisoning, post-intoxication vital status, intentions of the drug use, and etc were recorded for each patient based on medical files. It should be noted that the following conditions are the indications for intubation in cases with a diagnosis of poisoning of chemical compound: (i) respiratory failure (including airway blockage); (ii) intubation as a standalone therapy or to support a specific therapy; and (iii) airway protection in the unprotected airway.

## Data Analysis

Only data from patients who completed the trial were analyzed and reported. Statistical analyses were conducted using SPSS version 22 software (SPSS Inc., Chicago, IL, USA). Results were summarized using measures such as mean and standard deviation, or median and mode, along with the interquartile range (IQR), including minimum and maximum values, which were presented in graphs and

corresponding tables. Besides the overall scores, outcomes for each subgroup were also reported separately. The Chi-square and

Fisher's exact tests were applied for analysis. A p-value of less than 0.05 was considered statistically significant.

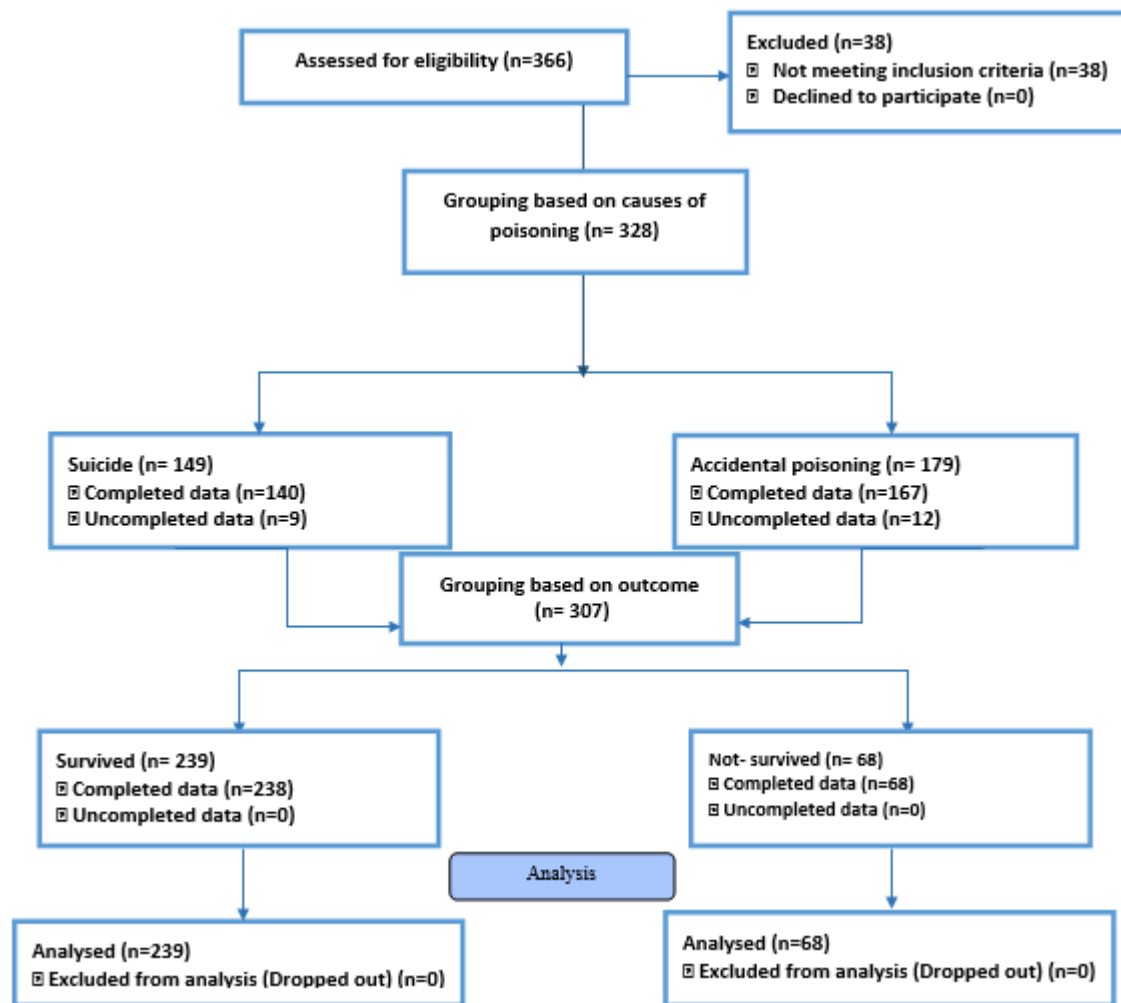


Figure 1. Study flowchart

### 3. Results

In this study, patients with chemical poisoning were evaluated, including 217 males (70.69%) and 89 females (29.31%). Regarding the frequency of specific toxic agents, methadone was the most common (46.8%), followed by opium (5.9%), organophosphates (5.9%), methanol (4.2%), and other chemical compounds (2.4%) (Figure 2).

When toxic agents were grouped, opioids were the most frequent cause of poisoning (60.6%), followed by pesticides (8.5%) (Figure 3). The majority of patients

(70%) were exposed to a single toxic substance. In terms of the cause of poisoning, 167 patients (54.4%) had accidental or substance abuse-related poisonings, while 140 patients (45.6%) were identified as intentional (suicidal) cases.

Of the total patients, 239 patients (77.9%) survived, while the remaining 68 (22.1%) died during hospitalization. The duration of ICU hospitalization in the two groups (suicidal intentions groups and accidental poisoning) was  $3.3571 \pm 1.21$  and  $4.6047 \pm 1.30$  days, respectively ( $P < 0.001$ ).

The mean age of patients in suicidal

intentions and accidental poisoning groups were  $35.67 \pm 18.45$  and  $40.44 \pm 18.91$  years old, respectively ( $P < 0.01$ ). Suicidal intent was also significantly higher among females (66.3%) than males (37.3%) ( $P = 0.001$ ). Analysis of toxic agent types revealed that patients poisoned with opium had the lowest rate of suicidal intent (16.7%), while those exposed to other chemical compounds had the highest rate (68.18%) ( $P = 0.001$ ). When grouped, patients

poisoned with pesticides had the highest rate of suicidal intent (80.8%), whereas those poisoned by opioids had the lowest (30.1%) ( $P = 0.001$ ) (Table 1).

Table 2 shows sample features based on the outcomes.

A significant difference was found between the two groups (survived and non-survived groups) in terms of the type of toxic agent, toxicant group, or ICU length of stay ( $P < 0.05$ ).

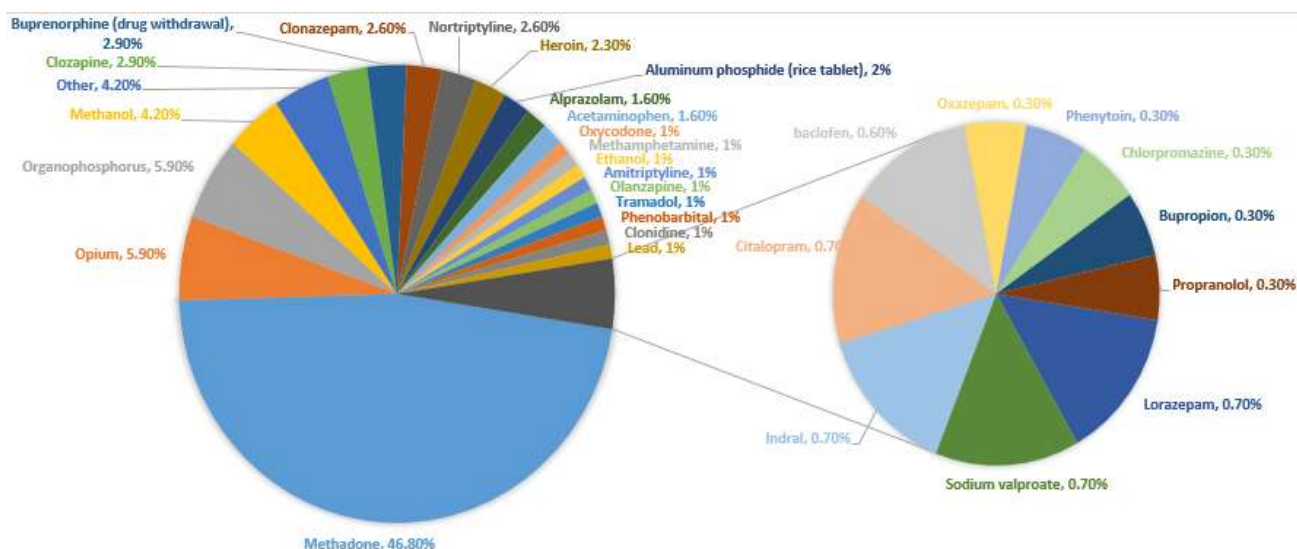


Figure 2. Frequency of toxification types in patients with a diagnosis of the poisoning of the chemical compound

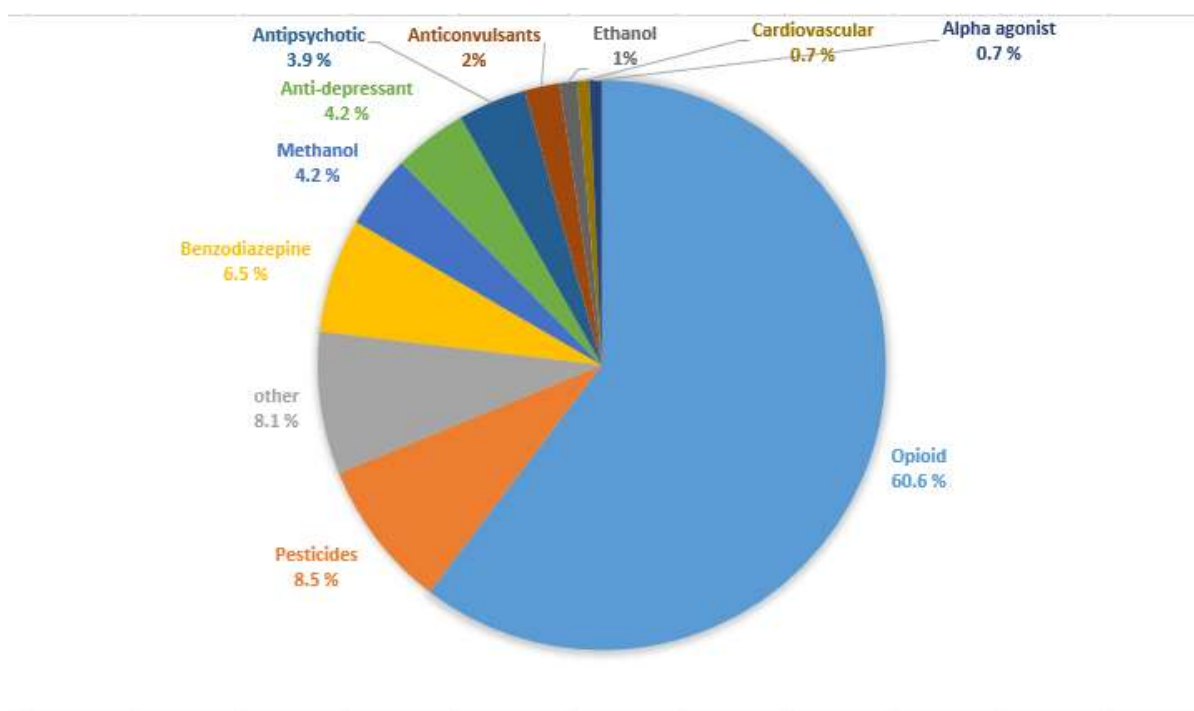


Figure 3. Frequency of groups of toxification in patients with a diagnosis of poisoning of the chemical compound

Table 1. Sample features based on the causes of poisoning

Cause Variables		Suicidal intentions N(%)	Accidental poisoning N(%)	p-value
Age group	Age (year)	35.67±18.45	40.44±18.91	0.000
	Less than 18 years old (n=60)	18 (30 %)	42 (70 %)	
	More than 18 years old (n=246)	121 (49.2 %)	125 (50.8 %)	
Sex	Male (n=217)	81 (37.3 %)	136 (62.7 %)	0.001
	Female (n=89)	59 (66.3 %)	30 (33.7 %)	
Toxification types	Methadone (n=144)	44 (30.5 %)	100 (69.5 %)	0.000
	Opium (n=18)	3 (16.7 %)	15 (83.3 %)	
	Methanol (n=13)	3 (23.1 %)	10 (76.9 %)	
	Other (n=132)	90 (68.18 %)	42 (31.8 %)	
Toxification types grouping	Opioid (n=186)	56 (30.1 %)	130 (69.9 %)	0.021
	Pesticides (n=26)	21 (80.8 %)	5 (19.2 %)	
	Other (n=95)	63 (66.3 %)	32 (33.68 %)	
ICU hospitalization duration (day)		3.3571±1.21	4.6047±1.30	0.000

Table 2. Sample features based on the outcomes

Cause Variables		Survived N(%)	Not- survived N(%)	p-value
Age group	Age (year)	37.5504±18.97	40.75±18.48	0.000
	Less than 18 years (n=60)	53 (83.33%)	7 (11.66%)	
	More than 18 years (n=246)	186 (77.83)	60 (22.17%)	
Sex	Male (n=217)	162 (65.86 %)	55 (34.14 %)	0.000
	Female (n=89)	76 (85.4 %)	13 (14.6 %)	
Toxification types	Methadone (n=144)	114 (79.1 %)	30 (20.9 %)	0.001
	Opium (n=18)	12 (66.7 %)	6 (33.3 %)	
	Methanol (n=13)	9 (69.2 %)	4 (30.8 %)	
	Other (n=132)	104 (78.8 %)	28 (21.2 %)	
Toxification types grouping	Opioid (n=186)	147 (79 %)	39 (21 %)	0.000
	Pesticides (n=26)	17 (65.4 %)	9 (34.6 %)	
	Other (n=95)	75 (78.9 %)	20 (21 %)	
ICU hospitalization duration (day)		4.0209±1.31	4.0579±1.43	0.000

#### 4. Discussion

In this study, we reported the toxification types, characteristics, and outcomes of patients admitted to the ICU who required endotracheal intubation due to poisoning. Our findings revealed that most patients were in their fourth decade of life and predominantly male. Dadpour et al. conducted a study investigating methadone poisoning and observed that 65% of patients were male (26). The findings of this study were consistent with our study. Masoumi et al. found that 54.7% of poisoned patients were female, with a mean age of 26.5 years (27). Although the prevalence of poisoning varies across regions and cultures, no consistent gender predominance has been observed.

Additionally, we found that nearly half of the patients (45.6%) had suicidal intentions, which were significantly associated with younger age, female gender, and pesticide poisoning. Bakhsha et al., in a study

conducted in Golestan province, also reported that suicidal intention was linked to younger age and female gender, consistent with our findings (28).

In the present study, opioids were the most common category of toxic agents, with methadone being the most frequently involved. Notably, 69.5% of methadone poisonings were accidental. In Iran, methadone syrup—commonly prescribed for opioid addiction treatment—is often stored in household water bottles, leading to frequent accidental poisonings, especially among children. Moreover, methadone has increasingly become a common agent in suicide attempts. Thus, methadone poisoning is rising both in individuals attempting to quit opioids and those exposed unintentionally, accompanied by an increase in related complications and fatalities (15, 29). Other studies have also identified opioid intoxication as a leading cause of mortality in various parts of Iran. Farzaneh et al. (30) in Ardabil (northwest Iran), Afzali (31) in

Hamadan (west Iran), and Ayatollahi et al. (32) in Yazd (central Iran) all reported opioids as the most common xenobiotic causing acute poisoning. Nafei et al. (33) also reported opioids as the leading cause of acute toxicity, a trend linked to sociocultural factors and the proximity to Afghanistan, a major producer of opium.

Among the various types of toxification, pesticides were the second most frequent cause of poisoning in our study. Similar findings were reported by Kudo et al. in Japan, where pesticides were identified as the second most common cause of poisoning (n = 60) (34). Shayesteh et al. also reported that aluminum phosphide poisoning was common among ICU patients and was associated with an extremely high mortality rate (35).

The overall mortality rate observed in our study was 22.14%, with higher death rates notably associated with older patients and males. This finding aligns closely with the results of Mehrpour et al. (36), who reported a mortality rate of 19.5% among ICU poisoning patients. However, Roya et al. evaluated the mortality and long-term survival of patients with acute intoxication in the ICU and observed that this mortality in the ICU was 1.2%, and the in-hospital mortality was 2.1% (37). This substantial difference in outcome likely reflects variations in healthcare infrastructure, access to early medical intervention, and the overall severity of cases admitted to intensive care units.

One important factor contributing to the higher mortality in our study is that it was performed at a provincial poisoning referral center. Such centers typically receive patients with more severe or complicated poisonings who are referred from smaller or less specialized hospitals. Consequently, the patient population tends to have more critical presentations, which naturally leads to higher mortality rates. Additionally, differences in the types of toxins

encountered, availability of antidotes, supportive care facilities, and timely access to specialized treatment could further influence these outcomes.

This disparity highlights the need for enhanced preventive strategies, early recognition, and prompt management of poisoning cases, particularly in regions with high-risk populations. It also emphasizes the importance of strengthening healthcare resources and protocols at primary and secondary care levels to alleviate the burden on referral centers and enhance overall survival rates.

## 5. Conclusion

Our results indicate that opioids, especially methadone, were the most frequent cause of poisoning in our study. Pesticide poisoning occurred significantly more often in patients with suicidal intent. Additionally, patient outcomes were significantly influenced by age, gender, type and grouping of toxic agents, and duration of ICU hospitalization.

**Acknowledgements:** This study was financially supported by Yazd Islamic Azad University of Medical Sciences, Yazd, center Iran. We gratefully acknowledge the dedicated efforts of the investigators, the coordinators, and the volunteers who participated in this study.

**Availability of data and materials:** The dataset analyzed during the current study is available upon reasonable request from the corresponding author.

**Conflicts of interests:** The authors have indicated that they have no conflicts of interest regarding the content of this article.

**Consent for publication:** Not applicable.

**Ethics approval and consent to participate:** The study received ethics approval from the Ethics Committee of Yazd Islamic Azad

University of Medical Sciences (IR.IAU.YAZD.REC.1399.002). The study was conducted in accordance with the principles of the Declaration of Helsinki.

**Financial disclosure:** None.

**Author contributions:** Conceptualization, Investigation and Project administration by Ghonghe OmidShafiee, Hamid Owliaey, Sareh Rafat Moghadam, Methodology and writing the original draft by Shadi Talebi, Hamidreza Ghasemirad, Marjan Shariatpanahi. Writing and Editing by Forouzan Farez, Faezeh Niknam, Mehrnoush Giahi Yazdi.

## References

- Mégarbane, B., Oberlin, M., Alvarez, JC. et al. Management of pharmaceutical and recreational drug poisoning. *Ann. Intensive Care* 10, 157 (2020). <https://doi.org/10.1186/s13613-020-00762-9> PMID:33226502 PMCID:PMC7683636
- Ahmadi A, Pakravan N, Ghazizadeh Z. Pattern of acute food, drug, and chemical poisoning in Sari City, Northern Iran. *Hum Exp Toxicol*. 2010;29:731-8. <https://doi.org/10.1177/0960327110361501> PMID:20144960
- Ala A, Vahdati SS, Moosavi L, Sadeghi H. Studying the Relationship Between Age, Gender and Other Demographic Factors with the Type of Agent Used for Self-Poisoning at a Poisoning Referral Center in North West Iran/Kuzey Bati Iran' da Bir Zehirlenme Referans Merkezinde Kendini Zehirlenmek için Kullanılan Ajan Tipi ile Yas, Cinsiyet ve Diğer Demografik Faktörlerin İlişkinin Arastırılması. *Journal of Academic Emergency Medicine*. 2011;10:2. <https://doi.org/10.5152/jaem.2011.022>
- Karbakhsh M, Zandi NS. Pattern of poisoning in the elderly: An experience from Tehran. *Clin Toxicol (Phila)* 2008;46:211-7. <https://doi.org/10.1080/15563650701638982> PMID:17906992
- Kassiri H, Feiz-Haddad M-H, Ghasemi F, Rezaei M, Ghanavati F. An epidemiologic and demographic survey of poisoning in Southwest of Iran. *Middle East J Sci Res*. 2012;12:990-6.
- Masoumi G, Ganjei Z, Teymoori E, Sabzghabae AM, Yaraghi A, Akbari M, 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. Persian.
- Sawalha AF, Sweileh WM, Tufaha MT, Al-Jabi DY. Analysis of the pattern of acute poisoning in patients admitted to a governmental hospital in Palestine. *Basic Clin Pharmacol Toxicol*. 2010;107:914-8. <https://doi.org/10.1111/j.1742-7843.2010.00601.x> PMID:20533924
- Shadnia S, Esmaily H, Sasanian G, Pajoumand A, Hassanian-Moghaddam H, Abdollahi M. Pattern of acute poisoning in Tehran-Iran in 2003. *Hum Exp Toxicol*. 2007;26:753-6. <https://doi.org/10.1177/0960327107083017> PMID:17984147
- Konradsen F, van der Hoek W, Cole DC, Hutchinson G, Daisley H, Singh S, et al. Reducing acute poisoning in developing countries--options for restricting the availability of pesticides. *Toxicology*. 2003;192:249-61. [https://doi.org/10.1016/S0300-483X\(03\)00339-1](https://doi.org/10.1016/S0300-483X(03)00339-1) PMID:14580791
- Mehrpour O, Zamani N, Brent J, Abdollahi M. A tale of two systems: Poisoning management in Iran and the United States. *Daru*. 2013;21:42. <https://doi.org/10.1186/2008-2231-21-42> PMID:23718923 PMCID:PMC3669081
- Bagheri P, Sepand M. A meta-analytical study of intentional and accidental non-food poisoning incidences in Iran (1991-2013) Koomesh. 2015;16:443-53. Persian.
- Kheir Abadi G. Intentional and unintentional poisonings and the relationship with some individual characteristics. *Scientific Journal of Kordestan University of Medical Sciences*. 2001;6:26-29. Persian.
- Spinello IM, Dellinger RP. Management of poisoning and overdose in the intensive care unit. *Clinical Pulmonary Medicine*. 2002 Jul 1;9(4):213-20. <https://doi.org/10.1097/00045413-200207000-00004>

14. Stevens JP, Wall MJ, Novack L, Marshall J, Hsu DJ, Howell MD. The critical care crisis of opioid overdoses in the United States. *Annals of the American Thoracic Society*. 2017 Dec;14(12):1803-9.  
<https://doi.org/10.1513/AnnalsATS.201701-022OC> PMID:28800256 PMCID:PMC5802515
15. Krantz MJ, Haigney MC. Methadone, synthetic opioids and torsades de pointes. *Torsades de Pointes*: Elsevier; 2022. p. 267-84.  
<https://doi.org/10.1016/B978-0-12-821446-6.00004-3>
16. Boyle, J.S., Bechtel, L.K. & Holstege, C.P. Management of the critically poisoned patient. *Scand J Trauma Resusc Emerg Med* 17, 29 (2009). <https://doi.org/10.1186/1757-7241-17-29> PMID:19563673 PMCID:PMC2720377
17. Duncan R, Thakore S. Decreased Glasgow Coma Scale score does not mandate endotracheal intubation in the emergency department. *J Emerg Med*. 2009;37(4):451-455.  
<https://doi.org/10.1016/j.jemermed.2008.11.026> PMID:19272743
18. Adnet F, Borron SW, Finot MA, Lapandry C, Baud FJ. Intubation difficulty in poisoned patients: association with initial Glasgow Coma Scale score. *Acad Emerg Med*. 1998;5(2):123-127.  
<https://doi.org/10.1111/j.1553-2712.1998.tb02596.x> PMID:9492132
19. Downes MA, Calver LA, Isbister GK. Intralipid therapy does not improve level of consciousness in overdoses with sedating drugs: a case series. *Emerg Med Australas*. 2014;26(3):286-290  
<https://doi.org/10.1111/1742-6723.12237> PMID:24810248
20. Jang DH, Manini AF, Trueger NS, Duque D, Nestor NB, Nelson LS, Hoffman RS. Status epilepticus and wide-complex tachycardia secondary to diphenhydramine overdose. *Clin Toxicol (Phila)* 2010;48(9):945-948.  
<https://doi.org/10.3109/15563650.2010.527850> PMID:21171853 PMCID:PMC4091778
21. Thundiyil JG, Rowley F, Papa L, Olson KR, Kearney TE. Risk factors for complications of drug-induced seizures. *J Med Toxicol*. 2011;7(1):16-23.  
<https://doi.org/10.1007/s13181-010-0096-4> PMID:20661684 PMCID:PMC3056005
22. Unverir P, Atilla R, Karcioğlu O, Topacoglu H, Demiral Y, Tuncok Y. A retrospective analysis of antidepressant poisonings in the emergency department: 11-year experience. *Hum Exp Toxicol*. 2006;25(10):605-612.  
<https://doi.org/10.1177/096032706072470> PMID:17165627
23. Jay SJ, Johanson WG, Jr, Pierce AK. Respiratory complications of overdose with sedative drugs. *Am Rev Respir Dis*. 1975;112(5):591-598.
24. Rollin M, Jaulim A, Vaz F, Sandhu G, Wood S, Birchall M, Dawas K. Caustic ingestion injury of the upper aerodigestive tract in adults. *Ann R Coll Surg Engl*. 2015;97(4):304-307.  
<https://doi.org/10.1308/003588415X14181254789286> PMID:26263940 PMCID:PMC4473870
25. Turner A, Robinson P. Respiratory and gastrointestinal complications of caustic ingestion in children. *Emerg Med J*. 2005;22(5):359-361.  
<https://doi.org/10.1136/emj.2004.015610> PMID:15843706 PMCID:PMC1726769
26. Dadpour, Bitar, Hatami, Liaghat, Eshraghi, Najari, Fars, Najari, Dorsa. Study of QT dispersion in electrocardiogram of patients with methadone poisoning. *Journal of the Faculty of Medicine, Tehran University of Medical Sciences*. 2019 Oct 10;77(7):453-7.
27. Masoumi G, Eizadi-Mood N, Akabari M, Sohrabi A, Khalili Y. Pattern of poisoning in Isfahan. *J Isfahan Med Sch*. 2012;29: 1317-24.
28. Bakhsha F (MSc), Behnampour N (MSc), Charkazi A (MSc). The prevalency of attempted suicide in Golestan province, North of Iran during 2003-07. *J Gorgan Univ Med Sci* 2011; 13 (2) :79-85.
29. Yaraghi Yaraghi A, Talaei-Zavareh AS, Mansourian M, Eizadi-Mood N. Naltrexone in unintentional methadone poisoning. *Journal Isfahan Medical School*, 2016. 34(384):p. 580-8.
30. Farzaneh E, Amani F, Etemad F. A Clinico-Epidemiologic Study on Patients with Opium Toxicity Treated at Ardabil Hospitals, Iran, 2014-2015. *Asia Pac J Med Toxicol*. 2016; 5:111-4.
31. Afzali S. Pattern of mortality due to poisoning by drugs and chemical agents in Hamadan,

- Iran, 2005-2007. Qom Uni Med Sci J. 2012;2(2):15-22.
32. Ayatollahi V, Behdad S, Oliwiaie H, Hajiesmaili MR, Dehghan M, Mehrpour O. Characteristic features of patients hospitalized with Narcotic poisoning in Yazd. Iran. Iran J Toxicol. 2011;4(4):362-6.
33. Nafei Z, Sabouhi N, Ferdosian F, Shamsi F. The pattern of acute poisoning in hospitalized children under 18 years old of Yazd, Iran. Asia Pac J Med Toxicol. 2021;10:44-7.
34. Kudo K, Ishida T, Hikiji W, Usumoto Y, Umehara T, Nagamatsu K, Tsuji A, Ikeda N. Pattern of poisoning in Japan: selection of drugs and poisons for systematic toxicological analysis. Forensic Toxicology. 2010 Jan;28:25-32. <https://doi.org/10.1007/s11419-009-0088-8>
35. Shayesteh M.A Survey on the Pattern of Aluminum Phosphide Poisoning in Gorgan, North of Iran. Sabzavar J Univ Med Sci 2017;1-9.
36. Mehrpour O, Akbari A, Jahani F, Amirabadizadeh A, Allahyari E, Mansouri B, et al. Epidemiological and clinical profiles of acute poisoning in patients admitted to the intensive care unit in eastern Iran (2010 to 2017) BMC Emerg Med. 2018;18:1-9 <https://doi.org/10.1186/s12873-018-0181-6> PMID:30231863 PMCID:PMC6146606
37. Roya B. In-Hospital Mortality and Long-Term Survival of Patients With Acute Intoxication Admitted to the ICU. Critical Care Medicine 2014; 42(6): 1471-1479. <https://doi.org/10.1097/CCM.000000000000245> PMID:24584062.