

# Toxic Agents Responsible for Acute Poisonings Treated at Four Medical Settings in Iran during 2012-2013: A Report from Iran's National Drug and Poison Information Center

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## Abstract

**Background:** Acute poisoning has been reported to be the most common reason for hospitalization in Iran. This study was designed to delineate the toxic agents responsible for acute poisonings in Iran by reviewing poisoning cases treated at four major referral hospitals for treatment of poisoning across the country.

**Methods:** This was a descriptive retrospective study on poisoned patients treated at four tertiary hospitals referral for poisoning in Iran, including Loghman Hakim Hospital (LHH) in Tehran, Imam Reza Hospital (IRH) in Mashhad, Noor and Ali Asghar Hospital (NAH) in Isfahan, and Ghaemshahr Razi Hospital (GRH) in Ghaemshahr, as reported to the National Drug and Poison Information Center during the years 2012 and 2013.

**Results:** During the two-year study period, 61,187 poisoned patients (i.e. 32,107 patients in 2012 and 29,080 patients in 2013) were treated at the four hospitals. In these two years, 22,185 patients (36.3%) were treated at LHH, 22,160 patients (36.2%) at IRH, 10,897 patients (17.8%) at NAH and 5,945 patients (9.7%) at GRH. Cumulatively in all hospitals, the highest rate of admissions was due to drug poisoning (42,017, 68.7%), recreational substances overdose (7,302, 11.9%) and pesticide poisoning (5,217, 8.5%).

**Conclusion:** Pharmaceutical products, substances of abuse and pesticides are the most common causes of poisoning-related admissions to referral Iranian poison treatment centers. Effective measures to reduce poisoning with these substances should be done.

**Keywords:** Epidemiology; Iran; Poison Control Centers; Poisoning

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## INTRODUCTION

Poisoning is a global health problem with increasing trend of morbidities and mortality around the world. Although unintentional poisoning deaths were most often a consequence of illicit drugs in earlier decades, since the latter half of the 1990s, medications have contributed to a greater number of fatal poisonings (1). In Iran, the most common reason for hospitalization, and the second cause of mortality in hospitalized patients, is poisoning (2).

The first Iranian Drug and Poison Information Center (DPIC) was established in Tehran in early 1997, as a division of the Iran's Food and Drug Organization (FDO) under the supervision of the Ministry of Health and Medical Education; currently known as the national DPIC or NDPIC (3). Since its establishment, it has had an important role for policy making in the expansion and development of newer DPICs across the

country (2-4). One of the most important tasks of the DPICs is collecting the data of toxic agents used for poisoning.

There are several tertiary hospitals in different cities of Iran which has a poison treatment center. These hospitals work under the supervision of medical universities and are equipped with poisoning emergency room, a specialized poisoning ward and an intensive care unit (ICU) (4). The Loghman-Hakim Hospital (LHH) Poison Center, which is affiliated to the Shahid Beheshti University of Medical Sciences, is a renowned center providing treatment for poisoning patients in Tehran and nearby cities (4,5). Medical Toxicology Center at Imam Reza Hospital (IRH) in Mashhad is a well-equipped setting, which actively provides specialized services to the residence of Mashhad and northeast Iran (4,6). A good quality of poisoning care is also delivered by experienced expert staff in Noor and Ali Asghar Hospital (NAH) in Isfahan (7). In Mazandaran province of Iran, a number of hospitals serve to poisoned patients (8), of which,

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one of the most well-known referral setting for poisoning is Ghaemshahr Razi Hospital (GRH) (9).

The pattern of poisoning in each region depends on several factors such as the availability of various poisons, socio-economic status of the population, religion and cultural factors, and drugs prescription manners. Hence, the current study was designed to delineate the toxic agents used for acute poisonings in Iran by reviewing poisoning cases treated at four major referral hospitals for treatment of poisoning across the country.

## METHODS

This was a descriptive retrospective study on poisoned patients treated at four tertiary hospitals referral for poisoning in Iran (LHH, IRH, NAH, GRH; Figure 1), as reported to the NDPIC during the years 2012 and 2013. The poisoning agents identified as responsible for pediatric and adult poisonings were recorded into NDPIC reporting checklists, in which the poisons and poisonous exposures are classified as pharmaceutical products, substances of abuse, poisonous gases, pesticides including aluminum phosphide (AIP), chemicals, alcohol (ethanol and toxic alcohols), venomous animal exposures, and food and herbal poisonings. The results express only cases that are not repeated and were classified by the regional NDPIC as closed. Cases with incomplete data were excluded. Data were analyzed using Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

## RESULTS

During the two-year study period, 61,187 poisoned patients were treated at the four major Iranian referral hospitals with specialized services for acute poisonings; i.e. 32,107 patients in 2012 and 29,080 patients in 2013. In these two years, 22,185 patients (36.3%) were treated at LHH, 22,160 patients (36.2%) at IRH, 10,897 patients (17.8%) at NAH and 5,945 patients (9.7%) at GRH. Cumulatively in all hospitals (Table 1), the highest rate of admissions was due to drug poisoning (42,017, 68.7%), recreational substances overdose (7,302, 11.9%) and pesticide poisoning including both AIP and non-AIP pesticides (5,217, 8.5%).

Followed by pharmaceuticals, which were the most common cause of poisoning in all hospitals in the two years, substances

of abuse were the second most common cause of poisoning in LHH and NAH, pesticides were the second most common cause of poisoning in IRH and miscellaneous poisons were the second most common cause of poisoning in GRH (Table 1).

As can be seen in figure 2, in 2012, the highest number of drug poisoning, recreational substance overdose, AIP poisoning, non-AIP pesticides exposures and chemical agent exposures were reported from LHH, while the highest number of poisonous gas exposures, alcohol ingestions and food and herbal poisonings were registered at IRH, and the highest number of venomous exposures were treated at NAH.

As can be seen in figure 3, a relatively similar pattern repeated in 2013; however, there were three changes; i.e. the highest number of drug poisoning and non-AIP pesticides poisoning were recorded from IRH instead of LHH, and the highest number of venomous animal exposures were from IRH instead of NAH. Overview of the trends also shows that

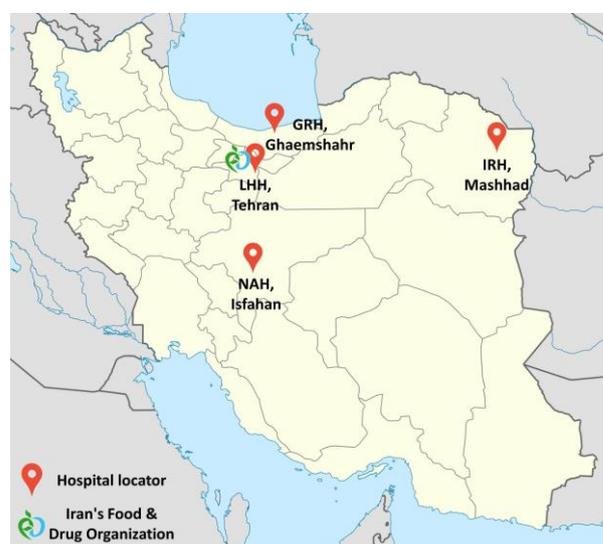


Figure 1. Catchment area of the study

Table 1. Cumulative incidence of each class of poisoning agent in each hospital during the two years of 2012-2013

Class of poisoning agents	Hospital				All hospitals (n = 6,1187)
	LHH (n = 22,185)	IRH (n = 22,160)	NAH (n = 10,897)	GRH (n = 5,945)	
Pharmaceutical products; n (%)	13,927 (62.8)	17,267 (77.9)*	6,347 (58.2)	4,476 (75.3)*	42,017 (68.7)
Substances of abuse; n (%)	4,014 (18.1)*	527 (2.4)	2,761 (25.3)*	0 (0.0)	7,302 (11.9)
Pesticides; n (%)	2,138 (9.6)*	1,983 (8.9)*	644 (5.9)	452 (7.6)	5,217 (8.5)
AIP; n (%)	636 (2.9)*	250 (1.1)	27 (0.2)	186 (3.1)*	1,099 (1.8)
Non-AIP; n (%)	1,502 (6.8)	1,733 (7.8)*	617 (5.7)	266 (4.5)	4,118 (6.7)
Chemical agents; no. (%)	1,768 (8.0)*	395 (1.8)	161 (1.5)	69 (1.2)	2,393 (3.9)
Alcohol; n (%)	0 (0.0)	672 (3.0)*	423 (3.9)*	81 (1.4)	1,176 (1.9)
Venomous animal exposure; n (%)	184 (0.8)	280 (1.3)*	189 (1.7)*	0 (0.0)	653 (1.1)
Poisonous gases; n (%)	94 (0.4)	254 (1.1)*	39 (0.4)	0 (0.0)	387 (0.6)
Food and herbal poisoning; n (%)	60 (0.3)	303 (1.4)*	17 (0.2)	0 (0.0)	380 (0.6)
Miscellaneous; n (%)	0 (0.0)	479 (2.2)	316 (2.9)*	867 (9.5)*	1,662 (2.7)

\* Higher than the mean of all hospitals

the number of drug poisoning cases, AIP poisoning cases and non-AIP pesticides poisoning cases multiplied by 221.8%, 295.7% and 250%, respectively, from 2012 to 2013 in GRH. Moreover, venomous animal exposures admitted to NAH approximately halved from 2012 to 2013 (123 to 66 cases).

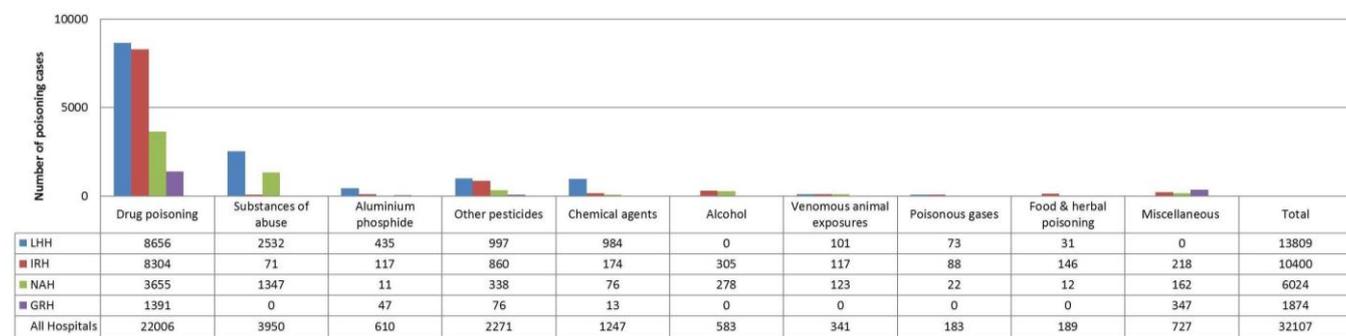
## DISCUSSION

In this study the main toxic agents used by over 60,000 Iranian poisoned patients during a two-year period were studied. In reality, the total number of poisoning cases from all over the country is higher than this value. Nonetheless, these medical settings altogether treat the highest proportion of poisoned patients in the country (4). Compared to the most recent epidemiologic report from IRH in Mashhad (6), the annual number of poisoning-related admissions has increased by 20% from approximately 9000 in 1993-2000 (6), to roughly 11,000 in 2012-2013. However, the number of poisoning-related admissions has remained relatively stable in LHH, Tehran, as it was about 10,200 in 2003 (5), and minimally increased to 11,092 on average in 2012-2013. Unfortunately, there were no previous reports on the total number of hospital admissions due to acute poisoning in NAH and GRH to compare our results with them. Although the global incidence of poisoning is not known (10), according to available reports across the globe, the most common toxic agents used for acute poisoning in middle income and high income countries are pharmaceutical products (11-14). In a similar pattern, we found that drug poisoning was the most frequent cause of poisoning-related admissions to 4 Iranian referral hospitals. The specific means of poisoning depends on what is readily accessible to patients, and this

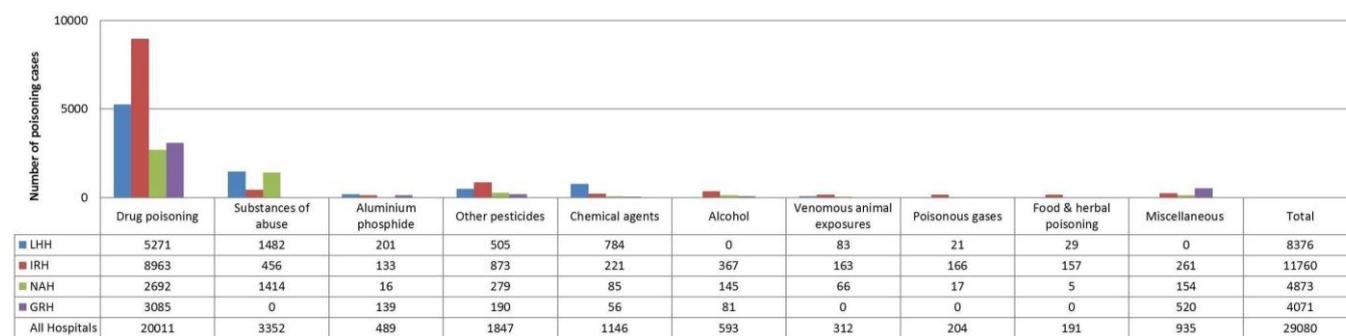
typically includes medications that may be purchased without prescription and easily diverted from their intended use (12,15).

The second most common cause of poisoning in this study was recreational substance overdose. This is similar to the pattern of poisoning in the United States (16), while it differs from poisoning statistics in the United Arab Emirates and Turkey (17-19). Easy availability of recreational substances in illegal markets in Iran and the USA, which is largely due to proximity to Afghanistan and Mexico, two major illicit drug production areas with sophisticated networks for drug trafficking (20), has contributed to the high prevalence of poisoning with these agents in these two countries. The importance of this factor becomes clearer when we see that the opioids are ranked lower in the list of common causes of poisoning in Turkey, a country farther from Afghanistan with Iran as its neighbor, perhaps at the expense of Iranian police fight against drug trafficking (21). In the UAE; however, cultural factors and strict rules against using and selling illicit drugs have resulted into very low frequency of poisoning with such substances (17,22). Nonetheless, it should not be ignored that the fear of being prosecuted by law enforcement, might lead to underreporting of the exact incidents in this country.

Being pesticides among top three causes of poisoning in Iran, as revealed in our study, is not an unusual event. In fact, poisoning with these substances is a common dilemma in Asian and developing countries (3,23,24), because there are no strict rules over sale and distribution of such poisons in these countries. However, in European countries and in the United States where firm regulations prohibit free sale of pesticides (13,14,25), these products rank among the least common causes of poisoning.



**Figure 2.** Number of poisoned patients treated at four medical settings of Iran in 2012 plotted against poisoning agent classes



**Figure 3.** Number of poisoned patients treated at four medical settings of Iran in 2013 plotted against poisoning agent classes

In order to reduce the health threat of poisonings, educational programs should be planned, the number of prescribed drugs for short intervals should be reduced, strict regulations on sale and distribution of highly poisonous chemicals and pesticides should be enacted, and effective monitoring on the patients with psychiatric illnesses and those seeking de-addiction therapies should be implemented (26). Public educational programs on poisoning and drug use have been set annually since 2006 by the FDO in association with Iranian medical universities to raise greater awareness and knowledge on poisoning threats. The FDO's national poison prevention week (22-28 October of every year) and organizing professional and public educational program through the media, schools and universities is anticipated to create greater awareness for the prevention of poisoning and to promote health.

### LIMITATIONS

Most hospitals in Iran have no organized up-to-date poisoning registry and their documentation database is not yet fully developed. Therefore, some hospitals only sent raw data to NDPIC in Tehran. In this regard, demographic features of poisoning cases are incomplete and could not be analyzed. In addition, the reports of no case of alcohol poisoning in LHH in both years, is much likely due to lack of proper documentation and reporting in Iranian hospitals, as there is published report on methanol intoxication cases treated in this hospital in the same time frame (27). The same limitation can be considered as the reason behind no case of recreational substance overdose from GRH. Moreover, drug poisoning comprised the highest proportion of poisonings in this study; however, due to the same reason, the exact name of drug or class of drug responsible for these poisoning could not be analyzed.

### CONCLUSION

Pharmaceutical products, substances of abuse and pesticides are the most common causes of poisoning-related admissions to referral Iranian poison treatment centers. Effective measures to reduce poisoning with these substances should be done.

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