

Epidemiologic Characteristics and Outcomes of Drugs Poisoning in the Hamadan, Iran: (2015-2019)

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Abstract

Background: Drug abuse is a global problem in most countries and poisoning caused by them has involved the emergency department (ED). This paper aims to investigate the changes in the epidemiological pattern of poisoned cases due to drugs in Hamadan province of Iran.

Methods: In this five year cross - sectional study, we assessed the epidemiologic pattern of poisoned cases due to drugs hospitalized in Farshchian - Sina Hospital of Hamadan, west Iran from March 2015 to March 2019.

Results: During this period, 7199 poisoned patients referred to hospital and 1773 of them hospitalized due to any kind of drugs. 81% were male and 19% were female ($p < 0.001$). The mean age in male cases was 40.85 ± 16.85 and in female cases was 42.37 ± 18.36 . 86.4% of the cases lived in urban areas and 13.6% of them lived in rural areas. The most common drugs were opium (33%), methadone (22.7%) and methamphetamine (20.9%). In 35.1% male cases and in 45.8% female cases the most common drugs were respectively opium and methamphetamine ($p < 0.001$). In 79.2% of cases, overdose and in 20.5% of them, suicide attempt was the most common causes of use. Most cases were alive and only 1.7% were deceased.

Conclusions: Although, poisoning by traditional drugs was still the most common cause of poisoning at the time of the study in this province, poisoning by synthetic drugs are on the rise.

Key words: Drugs, Poisoning, Epidemiology, Narcotics, Synthetic Drugs.

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INTRODUCTION

Today, poisoning by pharmaceutical and chemical agents is one of the most common causes for referring to ED. This is while poisoning by drugs is one of the most important of them. About 275 million people worldwide used one kind of drugs at least once during 2016 and nearly 450,000 people died as a result of drug use in 2015(1).

Poisoning by traditional and synthetic drugs is one of the most common causes for hospitalization.

Based on study by Burden of Diseases, Injuries, and Risk Factors Institute in 2017, 40.5 million people were dependent on opiates (95% uncertainty interval 34.3 - 47.9 million) and 0.27% people died from opiates overdose (2).

Based on the United Nations, Iran has the highest crime rates related to opiates use in the world (3).

According to the deputy head of the Iranian Counter Narcotics Headquarters; there are 2,800,000 addicts in Iran in 2018(4).

In 2013, of a total 5064 poisoned patients who were admitted to Imam Reza Hospital, Mashhad, Iran, 18% and

40% were poisoned by opiates and stimulant drugs, respectively (5).

1.2% of patients who referred to Imam Khomeini Hospital, Sari, Iran in 2017, observed symptoms of methamphetamine consumption (6).

Narcotics and recreational substances were the most common type of drugs responsible for poisoning in elderly patients admitted to Farshchian Hospital, Hamadan, Iran during 2008-2013(7).

During the ten - year period, 1426 cases of methadone poisoning were admitted to Loghman Hakim Hospital in Tehran, Iran (8).

The purpose of this study was to determine the epidemiological pattern of poisoning by any kind of drugs admitted to a referral hospital for poisonings in Hamadan, Iran during 2015- 2019.

METHODS

Study design

This cross - sectional study aimed at determining demographic and epidemiological characteristics of poisoning

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patients by any kind of illicit drugs in the Hamadan province of Iran.

A National Population and Housing Census survey is conducted every 5 years in Iran. According to the latest census in 2016, the Hamadan province had a population of over 1,738,234 (880318 male and 857916 female) people. The male/female ratio was 1:0.9. Of this population, 1097217, 639005 and 1012 people lived in urban, rural and suburbs, respectively (9).

Drugs poisoning incidence rates were estimated by relating the numbers of drugs poisoned cases to 100,000 numbers of persons as estimated from the 2016 National Population Census. Statistical analysis was performed using SPSS software 20. The analysis was mostly descriptive in nature; differences between various groups were evaluated with Student's t-test and chi-square test at 95% confidence interval.

Setting

The study was carried out at Farshchian – Sina Hospital in Hamadan province, Iran. This is the only tertiary hospital for the poisoned patients in this province. This study was conducted in a 5 – year period from March 2015 to March 2019.

Data collection

Each patient referred to the hospital with a history of any kind of drugs usage was evaluated, and after visiting a clinical toxicologist and adapting the clinical signs of poisoning with history entered to study. Also, urine rapid toxicology tests include: morphine, tetrahydrocannabinol, methadone, tramadol and d-Methylamphetamine which were performed

for all patients.

Any patient who was treated on an outpatient basis in ED and discharged after partial recovery by him or herself or relatives was excluded from study. After obtaining informed consent and explaining to patients and relatives about not disclosing their privacy, data-gathering checklists by interviewing patients or relatives was completed. Interviews were conducted after stability and ability to answer questions before discharge.

RESULTS

Of the 7199 cases of poisoned patients who were admitted to hospital, 1773 (24.6%) cases were hospitalized due to any kind of drugs. The frequency of drugs poisoning from 2015 to 2019 was 26.3%, 16%, 16.5%, 20.2% and 21%, respectively. 1437 (81%) were male and 336 (19%) were female. The male to female ratio was 4.27:1 ($p < 0.001$).

The mean age in all cases was 41.14 ± 17.15 , while in male cases was 40.85 ± 16.85 (Range 11-93) and in female cases was 42.37 ± 18.36 (Range 13-89), ($p < 0.001$). 11 cases were under 15 years old. The incidence rate per 100,000 persons of cases was 163.2 for males and 39.2 for females; furthermore, 139.5 for urban and 37.9 for rural areas and none of them lived in the suburbs.

Demographic characteristics are shown in table 1. Most cases were aged between 16-30 years, self-employed, urbanist and married. Also, the most common drugs was opium and overdose was the most cause of poisoning. The results revealed that there was a statistically significant difference between gender and job; cause of use and different types of drugs ($p < 0.001$).

Table 1. Demographic Characteristics based on gender

Variable	Gender N (%)			Pvalue
	Male	Female	Total	
Age				
< 15	8(0.5)	3(0.2)	11(0.6)	< 0.001
16-30	420(23.7)	166(9.4)	586(331)	
31-45	447(25.3)	85(4.8)	532(30.1)	
46-60	334(18.9)	43(2.4)	377(21.3)	
>60	228(12.9)	39(2.2)	267(15.12)	
Job				
Unemployment	473(26.7)	107(6.1)	580(32.7)	< 0.001
Self-employed	824(46.5)	22(1.2)	846(47.7)	
Employee	3(0.2)	2(0.1)	5(0.3)	
Worker	9(0.5)	0	9(0.5)	
Housewife	0	206(11.7)	206(11.7)	
Student	34(1.9)	9(0.5)	43(2.4)	
Retired	43(2.4)	4(0.2)	47(2.7)	
Unknown	37(2.1)	0	37(2.1)	
Location				
Urban	1245(70.2)	286(16.2)	1531(86.4)	0.480
Rural	192(10.9)	50(2.8)	242(13.7)	

Table 1. Continued

Variable	Gender N (%)			Pvalue
	Male	Female	Total	
Marital status				
Single	385(21.7)	107(6.1)	492(27.7)	0.053
Married	1042(58.8)	224(12.7)	1266(71.4)	
Others	10(0.6)	5(0.3)	15(0.8)	
Cause of use				
Overdose	1267(71.5)	137(7.7)	1404(79.2)	< 0.001
Suicide	168(9.5)	196(11.1)	364(20.6)	
Accidental	2(0.1)	3(0.2)	5(0.3)	
Common drugs				
Methamphetamine	216(12.2)	154(8.7)	370(20.9)	< 0.001
Cannabis	20 (1.1)	4 (0.2)	24 (1.4)	
Opium	505(28.5)	80(4.5)	585(33)	
Heroin	36(2)	13(0.7)	49(2.8)	
Methadone	363(20.5)	40(2.3)	403(22.7)	
Tramadol	28(1.6)	10(0.6)	38(2.1)	
Salvia	5(0.3)	0	5(0.3)	
Multi-drugs	264(14.9)	35(2)	299(16.9)	

Of 299 cases who had taken multi-drugs, 84 cases two or more opiate compounds, 15 cases methamphetamine and 200 cases benzodiazepines with opiate compounds were taken.

Most male cases (55.1%) had a history of opium addiction, while most women cases (67.6%) had no history of addiction.

In both genders, methamphetamine misuse significantly increased over the study period compared to other drugs. (Diagrams 1), which had a statistically notable difference ($p < 0.001$).

The most common consumable drug based on age categories was methamphetamine in the age range of 16- 30 years (Table.2), so that significant statistical difference was observed between different age ranges and kinds of drugs ($p < 0.001$).

As shown in diagrams 2, the highest percentage of cases in urban and rural areas was seen in methamphetamine cases between the ages of 15-30 years old. The subgroup analysis showed no difference between types of drugs in rural and urban areas based on different age ranges.

In 435(24.6%) of opium, 403(22.8%) of methadone and 38(2.1%) of tramadol cases, the most common route of exposure was ingestion, and in 347(19.6%) of methamphetamine, 86(4.9%) of opium, 24(1.4%) of cannabis and 6(0.3%) of heroin cases, inhalation was the most route of usage, and in 38(2.1%) of heroin, 23(1.3%) of methamphetamine cases injection was the most route of usage, and 299(16.9%) of multi drugs, 64(3.6%) of opium and 5(0.3%) of heroin cases used in various route. A significant statistical difference was seen between routes of exposure and any kinds of drugs ($p < 0.001$).

In 97.3% of methamphetamine, 83.3% of cannabis, 98.9% of opium, 83.7% of heroin, 96.5% of methadone and 84.2% of tramadol cases, urinary rapid toxicology test was positive.

Mortality rate was 1.7% and the most common was seen in multiple drugs (0.6%), opium (0.5%, methadone (0.3%), methamphetamine (0.3%) and heroin (0.1%) cases,

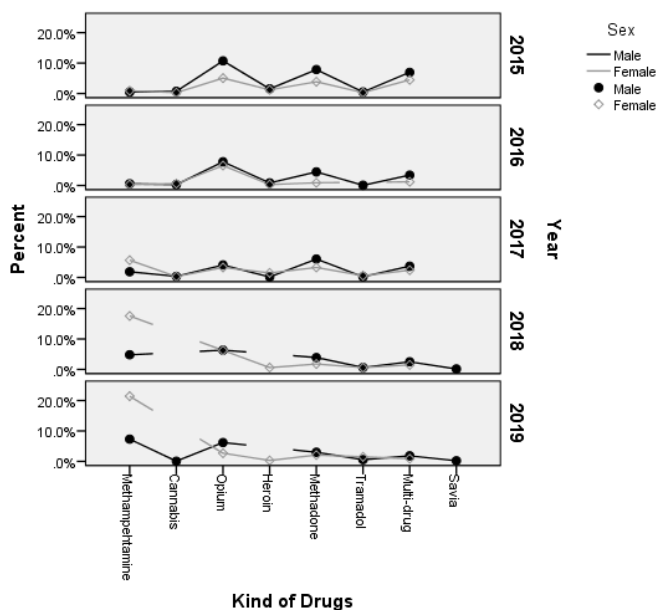


Figure 1. Distribution of any kind of drugs based on gender

Table 2. Consumable drugs based on age ranges

Variable	Age N (%)					P value
	<15	16-30	31-45	46-60	>60	
Methamphetamine	6(0.3)	203(11.5)	117(6.6)	37(2.1)	7(0.4)	< 0.001
Cannabis	0	20 (1.1)	4(0.2)	0	0	
Opium	4(0.2)	154(8.7)	178(10.1)	147(8.3)	102(5.8)	
Heroin	0	21(1.2)	15(0.8)	5(0.3)	8(0.5)	
Methadone	1(0.1)	99(5.6)	113(6.4)	105(5.9)	85(4.8)	
Tramadol	0	16(0.9)	9(0.5)	7(0.4)	6(0.3)	
Salvia	0	5(0.3)	0	0	0	
Multi-drugs	0	68(3.8)	96(5.4)	76(4.3)	59(3.3)	
Total	11(0.6)	568(33.1)	532(30)	377(21.3)	267(15.1)	

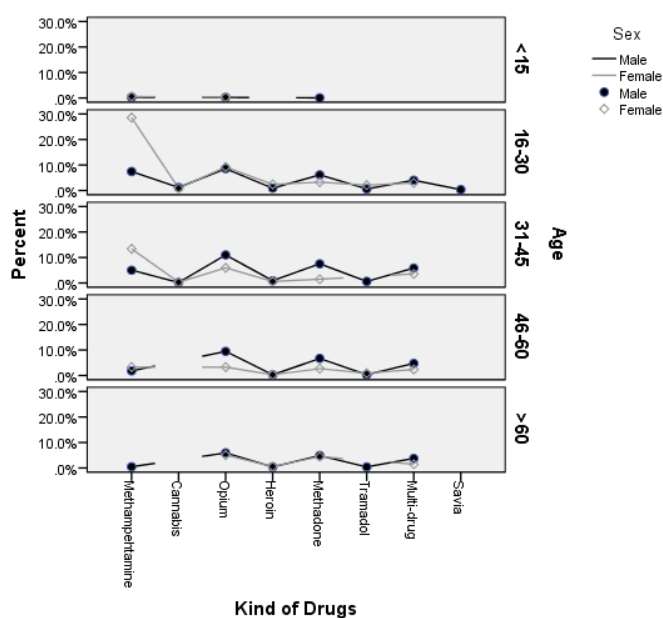


Figure 2. Distribution of kind of drugs based on location in different age ranges

respectively. There was no significant difference between mortality rate and kinds of drugs ($p= 0.501$).

DISCUSSION

Acute poisoning is one of the most frequent causes of visits to the ED, and its annual rate varies from 0.1% to 0.6% across the world (10-11). Meanwhile, poisoning with various drugs is one of the most common problems and every year a lot of them admitted to ED and some of them died.

In this study, of total poisoned cases who referred to the ED, 24.6% of them were hospitalized by different kinds of drugs during the five year period in Hamadan province. Moreover, this is extremely higher than the other studies, which had reported 3.5% and 2.3% (12-13), and was lower than the other study, in which 30.7% cases were admitted to

hospital (14). These accounts for a total incidence rate of 102 per 100,000 persons, while in the U.S were 174.6 per 100,000, which was higher than our study (15) and in Blackpool, England was 116 per 100,000 populations, which almost matched with our study (16).

One of the most important reasons for the high prevalence of drugs poisoning in Iran is bordering Afghanistan and illegal drugs entry and distribution throughout the country.

Common drugs:

In the current study, the most common drugs were opium, methadone and methamphetamine, respectively. In the other studies (5,14), opium cases were lower than this study, whereas, in another study(17) was similar to this study. Also, in Farzaneh study methadone poisoning cases were lower than our study (17). In our study, methamphetamine cases were extremely higher than the other studies (17-18).

Given that, most Iranians are traditional, there is still widespread use of traditional drugs such as opium and opium derivatives. Also, due to the existence of numerous centers of Methadone Maintenance Treatment (MMT), poisoning with methadone is very common. On the other hand, the synthetic drugs poisoning cases are increasing, which could possibly be due to its low price and easy supply.

Age and gender:

In various studies that have been done (11, 19-21), majority of cases were male, which is consistent with our study. On the other hand, as Mehrpour study (14) most male cases used opium, while most females used methamphetamine, which was not similar to Winkelman study (22).

As the other studies, in the current study, most cases were between 16-30 years old and especially methamphetamine cases were higher than other drugs. (21, 23).

Despite the high number of opium and methadone cases, our results showed that these agents had decreased in both gender, while methamphetamine, especially in women, had

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increased during the study period. Decreasing trend in opium cases was from 36.6% to 26.6% and in methadone cases was from 27.1% to 13.6%, meanwhile methamphetamine cases strongly increased from 2.2% to 48%. As in our study, there was a strong increase in methamphetamine cases in Gollmann study (12). According to a more active participation of men in society and more desire to use traditional drugs, opium use is very common. On the other hand, one of the reasons for high methamphetamine usage in women was to reduce appetite and lose weight.

The reasons for the decrease in the age of synthetic compounds which can play an important role are ease of access, cheap price and ease of distribute in schools and universities.

Job:

As similar to Meysamie study(24), most men in this study had freelance jobs like farmer; day laborer; driver and shopkeeper, and more than half of them were opium users, but contrary to our study, in the other studies most cases were unemployed(21,25). Methamphetamine was the most common drugs used in women's cases and most of them were unemployed. In student cases methamphetamine was the most consumable drug and was mostly seen in male cases, but in another study, majority of teenagers substance poisoned cases were students and sedative / hypnotics were the most common drugs (26).

Employment status is also important; economic problems and fear of losing a job, especially in men, were significant risk factors for drugs use.

It seems that increasing activity and libido, career concerns, some psychiatric disorders and some social problems could be the reasons for methamphetamine consumption among student??

Location:

Most of the cases lived in urban areas with a ratio of 6.3:1 and the main drug in both areas was opium. In urban areas, most opium cases were in the age of 31-45 years, whereas in rural areas were in the age of 46-60 years. Also, most methamphetamine cases in urban and rural areas were in the age of 16-30 years.

Contrary to this study, in the Kumar study (27) most cases lived in rural areas, but in Shakeri study as same with our study most cases lived in urban areas (5).

Marital status

In this study, as similar to the other studies, married cases had the highest rate of drugs use (21, 27). In both studies, opium for single cases and methamphetamine for married cases were the main consumption materials.

It seems that due to the availability of drugs in married men and women, the rate of poisoning is high. On the other hand, one of the reasons for the high rate of methamphetamine use among women can be for weight loss.

Cause of consumption

However, in many studies, the most common method of suicide was taking medicines (11, 28) but in our study, the

most common cause of poisoning was overdose due to misuse. Only 5 cases were poisoned due to accidental taking. Same as the other study, in the present study most cases related to overdose were seen in males between the age of 31-45 years old and had taken opium(14).

Most cases related to suicide had taken methamphetamine and most of them were female between age 16-30 years old, but in the other study, among the suicidal cases, alcohol was the main substance used (25).

Route of exposure

Unlike another study (21), which inhalation and ingestion were the most common forms of intake, in our study the most common forms were ingestion and inhalation. The high oral consumption of opium and methadone may be one of the important reasons for this matter.

Outcome:

In the present study like another study (13), most cases survived. Only 1.7% of all cases died, which is consistent with the other study (29).

During the period study from 2015 to 2019, the mortality rate was 0.3%, 0.2%, 0.1%, 0.5% and 0.4%, respectively. The incidence of mortality rate per 100,000 people was 1.8.

The highest number of mortality was seen in multiple drugs; opium, methadone, methamphetamine and heroin poisoned cases, respectively, which in opium cases was similar to Akhgari study (30), while in heroin cases was higher than Amir Study (13).

Quick access to ED, timely diagnosis, appropriate treatments and supportive care could be the most important causes of mortality reduction. On the other hand, due to more dangerous side effects of opiate compounds, most mortality was seen in these cases.

CONCLUSION

Poisoning with different types of drugs is one of the most important reasons for referring to medical centers and if not diagnosed and treated, it will lead to death, therefore, recognizing common drugs used in each region can be helpful in this regard. Also prevalence, demographic data, causes of use and outcome can be used in prevention and health planning. Our study showed that, there was no significant increase in numbers of poisoning by any kind of drugs during the years of study in this province, but the number of cases of traditional drugs such as opium and methadone declined remarkably and synthetic drugs such as methamphetamine have been increased. Also, in female cases, poisoning by methamphetamine were more than opiate compounds. On the other hand, unfortunately, the age range of drug use in both gender is very low.

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LIMITATIONS

In this study, only patients hospitalized to the poisoning ward were evaluated and none of outpatients were assessed,

so this point should be considered in future studies.

Conflict of interest: None to be declared.

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REFERENCES

- Information sheet on opioid overdose. , August 2018; Available from: https://www.who.int/substance_abuse/information-sheet/en/.
- Degenhardt L, Grebely J, Stone J, Hickman M, Vickerman P, Marshall BDL, et al. Global patterns of opioid use and dependence: harms to populations, interventions, and future action. *Lancet* 2019 Oct 26; 394(10208):1560-1579. DOI: 10.1016/S0140-6736(19)32229-9.
- Raesi -Vanani A, Rahmani AH, Parsa -Payam S. An investigation of the clinical signs, and frequency of street drug poisoning in patients referred to Razi Hospital of Ahvaz city, 2008-2013. *APJMT* 2019; 8:56-60. DOI: 10.22038/APJMT.2019.13431.
- The latest statistics on the number of drug addicts in the country. July 2019; Available from: <https://www.yjc.ir/en/news/7007749>.
- Shakeri MT, Saffari SE, Dadpour B, Aghajani H, Hadianfar A, Afshari R. Geospatial analysis of acute poisonings at Mashhad, Iran in 2013. *APJMT* 2019; 8(3):83-89. DOI: 10.22038/APJMT.2019.13825.
- Hadinezhad P, Zarghami M, Montazer H, Moosazadeh M, Ghaderi F. Study of methamphetamine use in patients referred to emergency ward of a General Hospital at North of Iran in 2017. *Addiction & Health* 2019; 11(1):18-25. DOI: 10.22122/ahj.v11i1.222.
- Afzali S, Seifrabiei MA, Taheri SK, Pourabdollah J. Acute poisoning in elderly; a five-year study (2008-2013) in Hamadan, Iran. *APJMT* 2015; 4:143-6. DOI: 10.22038/APJMT.2015.6360.
- Soltaninejad K, Hassanian-Moghaddam H, Shadnia S. Methadone related poisoning on the rise in Tehran, Iran. *APJMT* 2014; 3:104-9. DOI: 10.22038/APJMT.2014.3378.
- Statistical Centre of Iran. Selected Findings of the 2016 National Population and Housing Census. April 2018; Available from: https://www.amar.org.ir/Portals/1/census/2016/Census_2016_Selected_Findings.pdf.
- Hanssens Y, Deleu D, Taqi A. Etiologic and demographic characteristics of poisoning: a prospective hospital-based study in Oman. *J Toxicol Clin Toxicol* 2001; 39:371-80. DOI:10.1081/clt-100105158
- Zhang Y, Yu B, Wang N, Li T. Acute poisoning in Shenyang, China: a retrospective and descriptive study from 2012 to 2016. *BMJ Open* 2018; 8(8):1-11. DOI: 10.1136/bmjopen-2018-021881.
- Gollmann M, Frimlova G, Just S, Liebetau G, Prasa D, Stürzebecher A, et al. Substance abuse poisoning reported to the poisons information centre Erfurt from 2002 to 2016. *Gesundheitswesen* 2019; 81(05): 397-404. DOI: 10.1055/a-0592-6674.
- Amir A, Haleem F, Mahesar G, Abdul Sattar R, Qureshi T, Ghufuran Syed J, et al. Epidemiological, poisoning characteristics and treatment outcomes of patients admitted to the National Poisoning Control Centre at Karachi, Pakistan: A Six Month Analysis. *Cureus* 2019; 11(11): e6229. DOI: 10.7759/cureus.6229.
- 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 Emergency Medicine*; 2018;18:30. DOI: 10.1186/s12873-018-0181-6.
- Annual Surveillance Report of Drug-Related Risks and Outcomes | United States CDC National Center for Injury Prevention and Control 2018. The Current Drug Overdose Epidemic in the United States.p:7. Available from: <https://www.cdc.gov/drugoverdose/pdf/pubs/2018-cdc-drug-surveillance-report.pdf>.
- Hospital admissions with a primary diagnosis of poisoning by illicit drugs. Statistics on drugs misuse England, 2017. Available from: <https://files.digital.nhs.uk/publicationimport/pub23xxx/pub23442/drug-misu-eng-2017-rep.pdf>.
- Farzaneh E, Amani F, Etemad F.A clinico-epidemiologic study on patients with opium toxicity treated at Ardabil Hospitals, Iran, 2014-2015. *APJMT* 2016; 5:111-4. DOI: 10.22038/APJMT.2016.8137.
- Darvishzadeh H, Mirzaee M, Jahani Y, Sharifi H. Age of onset of methamphetamine consumption among the Iranian youth aged 19-29: A cross-sectional Study. *Addiction and Health* 2019; 11(3):138-146. DOI: 10.22122/ahj.v11i3.231.
- Jabalamel M, Ezadi N. Frequency distribution of opiate poisoning according to individual characteristics and clinical manifestations. *Armaghan E Danesh journal*. April 2005; 37(6):15-9.
- Vallersnes OD, Jacobsen D, Ekeberg Ø, Brekke M. Outpatient treatment of acute poisoning by substances of abuse: a prospective observational cohort study. *Scand J Trauma Resusc Emerg Med*. 2016; 24: 76. DOI: 10.1186/s13049-016-0268-6.
- Goodarzi F, Karrari P, Eizadi-Mood N, Mehrpour O, Misagh R, Setude S, et al. Epidemiology of drug abuse (Chronic Intoxication) and its related factors in a MMT clinic in Shiraz, Southern Iran. *IJT* 2011; 4(4):377-380.
- Winkelman TNA, Admon LK, Jennings L, Shippee ND, Richardson CR, Bart G. Evaluation of amphetamine-related hospitalizations and associated clinical outcomes and costs in the United States. *Jama Network Open* 2018; 1(6):e183758. DOI:10.1001/jamanetworkopen.2018.3758
- Syse VL, Brekke M, Grimsrud MM, Persett PS, Heyerdahl F, Hovda K E, et al. Gender differences in acute recreational drug toxicity: a case series from Oslo, Norway. *BMC Emergency Medicine*. 2019 19(1):29. DOI: 10.1186/s12873-019-0244-3.
- Meysamie A, Sedaghat V, Mahmoodi M, Ghodsi SM, Eftekhari B. Opium use in a rural area of the Islamic Republic of Iran. *EMHJ* 2009; 15(2):425-431.
- Pv A, Jun Wen T, Karuvelil MZ, Cheong A, Cheok C, Kandasami G. Unnatural death among treatment seeking substance users in Singapore: A retrospective study. *Int. J. Environ. Res. Public Health* 2019; 16: 2743. DOI: 10.3390/ijerph16152743.
- Zamani N, Hassanian -Moghadam H, Noroozi A, Saberi-Zafarghandi MB, Kolahi AA. Substance use among poisoned teenage patients. *Iran J Public Health* 2019; 48(10):1847-1854.
- Kumar S, Mehrotra D, Mishra S, Goel MM, Kumar S, Mathur P. Epidemiology of substance abuse in the population of Lucknow. *JOBCCR* 2015; 5:128 - 133. DOI: 10.1016/j.jobcr.2015.08.010.
- Ghaleiha A, Afzali S, Bazayar M, Khorsand F, Torabian S. Characteristics of hospitalized patients following suicide

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- attempt in Hamadan District, Iran. *OMG* 2012; 27(4): 305-310. DOI: 10.5001/omj.2012.75.
29. Vallersnes OM, Jacobsen D, Ekeberg Ø, Brekke M. Mortality, morbidity and follow-up after acute poisoning by substances of abuse: A prospective observational cohort study. *SJPH* 2018, 47(4):452-461. DOI: 10.1186/s13104-018-3834-3.
30. Akhgari M, Kahfi MS, Akha HS. Analysis of intoxication deaths: Causes and manners of death. *Indian J Pharm Sci* 2019; 81(1):32-38. DOI: 10.4172/pharmaceutical-sciences.1000476.