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An epidemiological survey of drug poisoning and a comparison with other poisonings cases admitted to a university hospital in Gorgan, Iran, 2008-2015

Mohammad Shokrzadeh[1], Amir Hajimohammadi[2,3], Reza Hoseinpoor[4], Azam Delaram[5], Yaghoub Shayeste[6*]

[1]Pharmaceutical Sciences Research Center, Pharmacology and Toxicology Dept., Mazandaran University of Medical Sciences, Sari, I.R. Iran; [2]Surgery Dept., Golestan University of Medical Sciences, Gorgan, I.R. Iran; [3]Clinical Research Development Unit, 5 Azar Hospital, Golestan University of Medical Sciences, Gorgan, I.R. Iran; [4]Student, Biostatistics and Epidemiology Dept., Hamadan University of Medical Sciences, Hamadan, I.R. Iran; [5]Medical Records Center, 5 Azar Hospital, Golestan University of Medical Sciences, Gorgan, I.R. Iran; [6]Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, I.R. Iran.

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ABSTRACT

Background and aims: Acute drug poisoning is a major public health problem in the world.The aim of this study was to investigate the trends and characteristics of acute drug poisoning and to compare that with other poisonings in Gorgan, Iran.

Methods: This descriptive cross-sectional study was done from March 2008 to march 2015. Data were obtained from medical records. Stata software and Pearson's chi-squared test were used for data analysis.

Results: A total of 800 poisoning cases, 573 cases were due to drug poisoning. The majority of the 573 patients (50.8% male) were in the age range of 20-29 years (47.8%) and 78% of them were living in urban areas. The maximum number of poisoning occurred during summer season (27%). The most common agents involved in acute drug poisoning were sedatives-hypnotics drugs, especially BZDs (37.2%), followed by Tramadol (17.3%) and Cardiac drugs (13.1%). Poisoning most commonly occurred as ingestion of single drug (55%). More than half (77.1%) of the cases were intentional poisoning (suicide), followed by overdose (63.1%), drug abuse (51.9%) and accidental poisoning (17.3%). Moreover, the most common drug involved in intentional poisoning was BZDs (44%).9 patients (1.6%) died, of which 3(33.3%) were due to Narcotic drugs.

Conclusion: Drugs were the most common cause of poisonings and the majority of acute drug poisoning in Gorgan was associated with suicide attempts. So, easy access to the most prominent methods of suicide i.e. consumption of drugs particularly BZDs should be restricted.

Keywords: Drug; Poisoning; Intention, Epidemiology.

Original article

[*]**Corresponding author:** Yaghoub Shayeste, Health Management and Social Development Research Center, Golestan University of Medical Sciences, Gorgan, I.R. Iran, Tel: 00989113738979, E-mail: shayeste.yaghoub@gmail.com

INTRODUCTION

Poisoning is a major epidemic of non-communicable disease in the present century.[1] Acute poisoning is the reason for hospitalization for a major portion of patients admitted to emergency departments worldwide.[2-4] Poisoning cases are increasing day-by-day due to changes in lifestyle and social behaviour.[5] World Health Organization (WHO) estimated 0.3 million people die every year due to various poisoning agents.[1]

The pattern of poisoning varies from country to country and region to region depending on factors like geography, accessibility and availability of poison, socio-economic conditions, cultural and religious influences.[2-4,6]

Drug poisoning is one of the most common types of poisonings which accounted for a high percentage of poisoning.[3-6] According to this, a part of the patients admitted to emergency service were suffered from drug poisoning.[7] The poisoning mortality rate roughly tripled over the last three decades, with about 90% of these fatalities now caused by drugs.[8]

Moreover, drug poisonings can be intentional (suicide) or unintentional, both of which represent a growing portion of the global burden of injuries.[9] Advances in technology and social development have resulted in the availability of most drugs in the community.[10]

The drug group which was the main causative of acute poisonings was different among the countries.[11] In high income countries such as Norway, benzodiazepines (BZDs), ethanol and paracetamol (Acetaminophen) are the most common causes of poisoning, and also, in these countries, poisoning due to narcotics and drug overdoseis far more common than due to another agents.[1,6]

Studies conducted in different parts of Iran, including Tehran, Mashhad, Guilan and Sari, all point to the high prevalence of poisoning due to drugs and chemicals and also, tranquilizers (diazepam) were found to be the most common causes of drug-related poisoning.[12] Also, in the recent years, tramadol overdose has been one of the most frequent causes of drug poisoning in the country, especially in male young adults with a history of substance abuse and mental disorders.[13]

Finally, there have only been a few epidemiological reports on poisoning in different parts of Iran.[14] Moreover, due to the relatively easy availability of these agents and the increasing trend of poisoning with them, study on poisoning with these agents is essential. So, we decided to investigate the trends and characteristics of acute drug poisoning cases and to compare that with other poisonings by using data of 5 Azarhospital of Gorgan in Iran.

METHODS

Gorgan is the most populous city and the capital of Golestan province, north part of Iran. 5 Azar hospital of Gorgan is a university hospital in Gorgan that services in various fields including admission and treatment of poisoning cases in Gorgan city. An observational cross-sectional study was conducted on acute drug poisoning cases admitted to the adult emergency service of 5 Azar hospital with 12 years of age and

above who were hospitalized in this hospital, from March 2008 to March 2015. The ethical approval was obtained from ethical committee of the Golestan University of Medical Sciences (Gorgan, Iran). The diagnosis of poisoning was based on history given by the patients or their entourage and clinical examination. In our study, unintentional Poisonings classified into three types mainly: Accidental, overdose and drug abuse. In the following, data of poisoned patients including socio-demographic profile (such as gender, age groups, marital status, occupation, educational status and residence), drug groups, period of hospitalization, clinical manifestations, outcome and etc. derived from patient records in a present checklist. Patients with incomplete information (14 people) and those who left the hospital against medical advice (7 people) were also excluded. In this study, data were not directly collected by the researchers and were collected retrospectively with checklist, which may cause bias in data collection.

A descriptive analysis was done on all variables to obtain a frequency distribution. Quantitative variables were reported with range, frequency and percentage. Normality was confirmed using Kolmogorov Smirnov test. Analysis of difference between two categorical variables was done using the Pearson's chi-squared test and P-values less than 0.05 were considered statistically significant. Moreover, data were analysed using Stata software (version 11).

RESULTS

Of the 195,913 adult patients presenting to the 5 Azar hospital during the seven-year period, 800 (0.4%) were cases related to poisoning, it means that the prevalence of poisoning were 0.4%. Moreover, the most common causes of poisoning included: Drug (573, 71.6%), opium (70, 8.8%), aluminum phosphide (53, 6.7%), organophosphates (32, 4%), amphetamine compounds (23, 2.9%), bite (13, 1.6%) and others (36, 4.5%). So, in our study, 573 people were poisoned due to drug agents (71.6% of all poisoned patients). Also, drugs were the most common cause of poisonings.

In this study, 573 patients, 50.8% female and 49.2% male, were evaluated and female to male ratio was 1.03:1. There was no statistically significant difference according to gender (P>0.05) (Table 1). Moreover, the mean age for female subjects was 28.55±14.63 ranging in age from 12 to 87, while the mean age for male subjects was 28.57±14.59 ranging in age from 12 to 81. The mean of age for all subjects was 28.57±14.59. Among the different age categories, poisoning was most common (274, 47.8%) among patients between 20-29 years of age (Table 1).The youngest case was 12 years old and oldest was 87 years. The majority of patients (447, 78%) lived in urban areas. Regarding occupation, employed persons were the most frequent (210, 26.2%). Moreover, most patients (289, 50.4%) had high school educational levels and 48.9% of the cases were unmarried (Table 1). There were significant difference between drug poisoning and demographics characteristics including age groups (P<0.001), marital status (P<0.001), Occupation (P<0.001), educational status (P<0.001) and place of residence (P<0.001) (Table 1).

Table 1: Socio-demographic features and circumstances of poisoned patients

Variable		Number of cases	Percentage (%)	±SD	P
Gender	Male	282	49.2	0.49	0.707
	Female	291	50.8		
Age groups	10-19	137	23.9	16.49	<0.001
	20-29	274	47.8		
	30-39	73	12.7		
	40-49	36	6.3		
	50-59	16	2.8		
	60 and above	37	6.5		
Marital status	Single	280	48.9	1.06	<0.001
	Married	243	42.4		
	Divorced/ Widowed	13	2.3		
	Unknown	37	6.5		
Occupation	Unemployment	153	26.7	2.19	<0.001
	employment	156	27.2		
	Student	66	11.5		
	Housewife	140	24.4		
	Others	58	10.1		
Educational status	Illiterate	39	6.8	1.37	<0.001
	Primary school	43	7.5		
	Secondary school	107	18.7		
	High school	289	50.4		
	Collegiate	26	4.5		
	Unknown	69	12		
Residence	Urban	447	78	0.43	<0.001
	Rural	126	22		
Site of poisoning	Home	433	75.6	2.48	<0.001
	Outside home	43	7.5		
	Unknown	97	16.9		
Route of exposure	Oral	571	99.7	0.51	0.982
	Injection	2	0.3		

Highest incidence of poisoning was seen in summer (155, 27%) while the lowest was seen during winter (129, 22.5%) (P=0.462). Most cases of poisoning occurred on Tuesday (98, 17.1%), followed by Sunday (96, 16.8%) and Wednesday (86, 15%) (P=0.057). Maximum number of poisoning cases was observed during the

months of august (62, 10.8%) and February (60, 10.5%) (P=0.071). Also, no significant difference was seen in the trend of poisoning by season, month and day of week.

In majority of the cases, drugs had been consumed orally (571, 99.6%), Most cases of drug poisoning occurred at home (433, 75.6%) (Table 2).

Table 2: Circumstance of admission, hospitalization and outcome of poisoned patients

Variables		Males N (%)	Females N (%)	Total N (%)	±SD	P
Time of admit to hospital	Morning (6 am-12 pm)	45(60.81%)	29(39.19%)	74(12.9%)	0.95	0.078
	Afternoon (12 pm-6 pm)	95(48.47%)	101(51.53%)	196(34.2%)		
	Evening (6 pm-12 am)	97(50%)	97(50%)	194(33.9%)		
	Night (12 am-6 am)	45(41.28%)	64(58.72%)	109(19%)		
	Total	282(49.21%)	291(50.79%)	573(100%)		
Admitted to ICU	Yes	167(48.83%)	175(51.17%)	347(60.6%)	0.49	0.823
	No	115(49.78%)	116(50.22%)	231(40.3%)		
	Total	282(49.21%)	291(50.79%)	573(100%)		
Time interval between exposure and admission	>1h	15(35.71%)	27(64.29%)	42(7.3%)	0.33	0.147
	1-3h	101(48.56%)	107(51.44%)	208(36.3%)		
	3>	144(52.94%)	128(47.06%)	272(47.5%)		
	Unknown	22(43.14%)	29(56.86%)	51(8.9%)		
	Total	282(49.21%)	291(50.79%)	573(100%)		
GCS	GCS≤8	38(62.30%)	23(37.70%)	61(10.7%)	0.32	0.031
	GCS>8	244(47.66%)	268(52.34%)	512(89.3%)		
	Total	282(49.21%)	291(50.79%)	573(100%)		
Duration of hospitalization	<24h	50(44.64%)	62(55.36%)	112(19.5%)		0.002
	24-72h	108(43.03%)	143(56.97%)	251(43.8%)		
	>72h	124(59.05%)	86(40.95%)	210(36.6%)		
	Total	282(49.21%)	291(50.79%)	573(100%)		
Outcome	Survival	216(48.54%)	229(51.46%)	445(77.7%)	0.76	0.536
	Death	6(66.67%)	3(33.33%)	9(1.6%)		
	Self-satisfaction	60(50.42%)	59(49.58%)	119(20.8%)		
	Total	282(49.21%)	291(50.79%)	573(100%)		

Among these cases, single-drug poisoning accounted for 55% (n=315) of all drug poisoning cases, 16% (n=92) of cases involved two drugs and 20.8% of cases had been consumed (n=119) three or more drugs, and the remaining 8.2% of cases had no known drugs (Table 3). Our findings also reveal that the most common drugs involved in poisoning (alone or in combination with other drugs) were BZDs (213, 37.2%), tramadol (99, 17.3%) and cardiac drugs (75, 13.1%).

Table 3: Causes of poisoning according to the number of drug

Number of drug	Frequency	%
One	315	55
Two	92	16
Three or more	119	20.8
Unknown	47	8.2
Total	573	100

Most of the cases included in this study were because of intentional poisoning (suicide) (442, 77.1%), while the rest were other types of poisoning such as overdose (63, 11%), drug abuse (51, 8.9%), and accidental poisoning (17, 3%) (Figure 1).

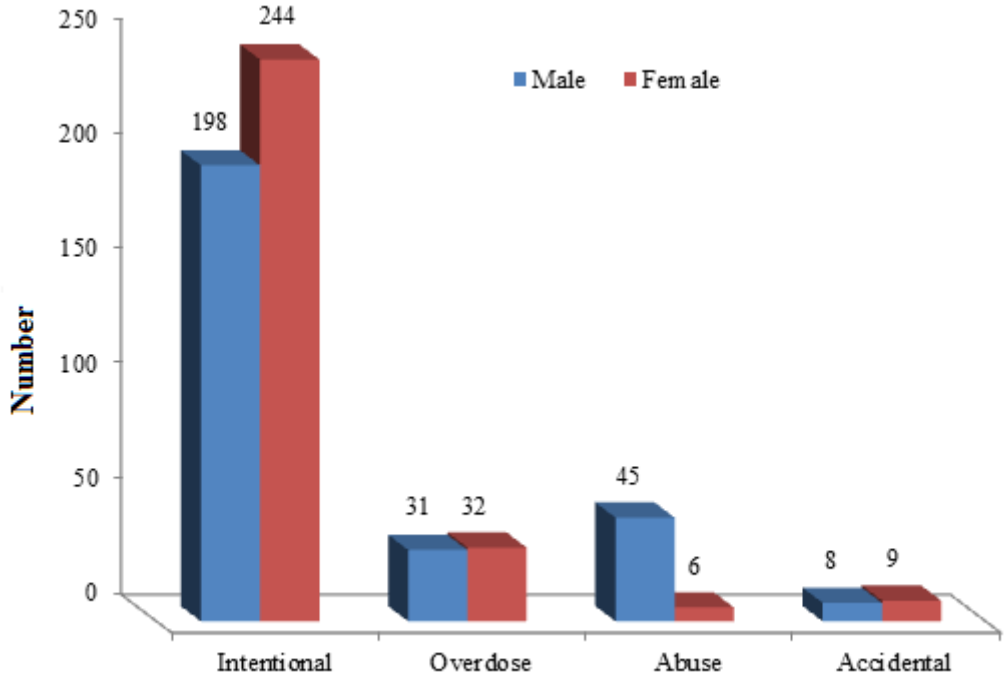

Figure 1: Types of drug poisoning

The most common overdosed medication was cardiac drugs (44.4%), followed by BZDs (17.5%) (alone or in combination with other drugs). Moreover, tramadol (51%), and narcotic drugs (35.3%), alone or in combination with other drugs, were the major form of drug abuse. Also, 47% of accidental poisonings were due to consumption of narcotic drugs (alone or in combination with other drugs). Moreover, about intentional poisoning, the most frequent problems were conflict with family members; these were 208 (47.1%) of the cases and also, mental disorders is the second most common risk factor for intentional poisoning (78, 17.6%) (alone or in combination with other causes). In addition, 229 persons (55.8%) of the intentional poisoning were in the age group 20-29 years old and intentional poisoning tendency was greater in females (244, 55.2%) than males (198, 44.8%).

The time lapse between exposure and admission to the hospital was more than three hours in 90.7% of the instances. Most of the patient admissions had occurred between 12 and 6 p.m. (196, 34.2%) (Table 2). Regarding clinical symptoms, neurologic manifestations were the most common findings (464, 81%) (alone or in combination with other symptoms). Hospitalization time was between 24-72 hours in 43.8% of the cases. In the current study, 60.6% of patients were admitted to the ICU ward. Furthermore, GCS score (level of consciousness) ≤ 8 were seen in the 10.7% of patients (when entering the hospital) (Table 2). Of all the patients, 77.7% were discharged after toxicological treatment and 20.8% left the hospital either contrary to medical advice or without notice

and 1.6% died, including 6 men (66.7%) and 3 women (33.7%). According to categories of pharmaceutical agents, most death were among patients who were poisoned with narcotic drugs (3, 33.3%) followed by unknown drug agents (2, 22.2%) and also, cardiac drug, anti-seizure, BZDs and NSAID (each one 11.1%).

DISCUSSION

In our study, drug poisoning were the most common cause of poisonings, these findings were consistent other studies conducted in Iran and another countries.[1,12] In this study 573 drug poisoning were identified during the seven-year study period. Majority of the patients in our study belonged to the age group of 20-29 years which resembled the pattern of drug poisoning in different parts of Iran, including Sari and Shahrekord, also, some countries such as Turkey.[7,12] This is probably due to the stress of modern life-style, interfamily conflicts and high unemployment rates especially among young population. Moreover, this study showed that females are slightly more vulnerable than males. This is comparable with the general pattern of acute drug poisonings in Rasht, Mashhad, Kuwait, Greece and Saudi Arabia.[9,12] Our findings are in contrast with the one conducted in Tehran where the majority of cases involved male.[15]

In addition, further research is required to investigate the reasons for having a higher proportion of females with drug poisoning in Gorgan. However, some researchers say that women are usually away from working, and educational lives. Psychological pressure of some restricting socio-cultural factors in the population might have increased poisoning attempts in this group.[7]

An important result obtained from our study is that sedatives-hypnotics drugs(such as BZDs and barbiturates) particularly BZDs; were the most common poisons responsible for acute adult poisoning in Gorgan. In the other hand, our survey showed that BZDs poisonings (alone or in combination with other drugs) are responsible for approximately 37.2% of total admitted drug poisoning cases in Gorgan. This could be attributed to the easy availability in houses and unrestricted sale of large packs of benzodiazepines in pharmacy. In addition, Poisoning with BZDs has been found to be very common in Tabriz, Tehran and another countries such as Norway.[6,16,17] These results are in contrast to those reported from some countries such as Malaysia, Oman and Turkey where the majority of drug poisonings were due to paracetamol or anti-depressants.[18-22]

Moreover, the most common drug involved in intentional poisoning in our study was BZD (44%). BZDs are used as sedatives and to treat anxiety, seizure, withdrawal disorder, sleeping disturbance, and agitation. Because of their versatility, BZDs are widely prescribed, and there are nearly 50 kinds of BZDs available worldwide. However, the high incidence of BZD poisoning reflects their universal use and availability. BZD poisoning refers to ingesting the BZD class in quantities greater than those recommended or generally used.[23]

Furthermore, Tramadol was the first drug agent which was abused in our study (74.7% in males and 25.3% in females). Drug abuse is the recurrent use of illegal drugs, or the misuse of prescription or Over-The-Counter (OTC) drugs with negative consequences.[1,24,25] In Iran, tramadol has been available since 2002 and has a widespread use.[26] Tramadol abuse has been one of the most frequent causes of drug poisoning in Iran in recent years, especially in young adults with the history of substance abuse.[13]

Narcotic drugs were the first cause of accidental poisoning (47%) and also,

poisoning with narcotic drugs have been identified as the agent responsible for the majority of death in the present study (33.3%). Global epidemic of narcotic use has extended and transformed to an important health issue, especially in developing countries such as Iran.[27]

In addition, cardiac drugs were the most common causes of overdose cases (46% in elderly people aged 60 years and over). In our survey, drug overdose can be defined as unintentionally administering a higher dose of prescription or non-prescription drugs than recommended. Moreover, drug overdose is considered a major health problem, particularly in developed countries and also, in many Asian countries, drug overdose mortality is considered a major problem.[28]

Older age is associated with a higher drug overdose rate for several reasons. First, elderly people particular aged 65 years and over tend to have more medical problems; thus, they may take many medicines that might interact with each other and cause an overdose. Second, many elderly people live independently and might find it difficult to calculate the correct dose. In addition, they may not recognize the symptoms of drug overdose when it occurs.[29]

While 55% of all drug-poisoning cases was due to a single drug, 36.8% of the cases was resulted from two or more drugs which is similar to a study by Cemil Kavalci et al in Ankara whereas in the another study reported from Malatya, Poisoning most commonly occurred as ingestion of multiple drugs.[7,30]

Another important point is that 442(77.1%) of drug poisoning cases occurred suicidal intent (intentional poisoning).We found high rates of suicide attempts, as shown by many studies from our country and worldwide. Methods of suicide are diverse throughout the world. In Iran, drug poisoning and self-immolation are two common methods of suicide.[9,11,12,16,19]

In this study, family quarrel was the main cause of intentional poisoning. A family quarrel is a common term which might encompass several scenarios including quarrel with the spouse, quarrel with parents and quarrel with another members in the family. This study indicates that there is a higher rate of suicide attempts among patients with family quarrel. Also, mental disorders are the second most common risk factor for intentional poisoning. According to World Health Organization, instigating mental health services after a person has attempted suicide is effective in reducing the risk of further attempts.

CONCLUSION

In conclusion, most cases of drug poisoning occurred in the young-adult group. Sedatives-hypnotics drugs particularly BZDs; were the most common poisons responsible for acute adult poisoning. In our study, the highest number of deaths was due to narcotic drugs poisoning. To prevent such poisonings, the community education about the danger of central nervous system-acting drugs and reducing to access are recommended. Furthermore, intentional poisoning (suicide) was the most important cause of the drug poisonings for both of the gender and also, family quarrel and mental disorders were the main causes of intentional poisoning. Suicide prevention is a collective responsibility and must be spearheaded by the government and the society. The risk factors identified in this study could stimulate further research and assist in targeted delivery of preventive strategies to protect public health. Furthermore, community psychiatry programs and psychological consults are

required to identify high risk young adults prone to commit suicide.[29]

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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REFERENCES

1. Singh SP, Aggarwal AD, Oberoi SS, Aggarwal KK, Thind AS, Bhullar DS, et al. Study of poisoning trends in north India-a perspective in relation to world statistics. J Forensic Leg Med. 2013; 20(1): 14-8.
2. Afshari R, Majdzadeh R, Balali-Mood M. Pattern of acute poisonings in Mashhad, Iran 1993-2000. J Toxicol Clin Toxicol. 2004; 42(7): 965-75.
3. Kara H, Bayir A, Degirmenci S, Kayis SA, Akinci M, Ak A, et al. Causes of poisoning in patients evaluated in a hospital emergency department in Konya, Turkey. J Pak Med Assoc. 2014; 64(9): 1042-8.
4. Lund C, Teige B, Drottning P, Stiksrud B, Rui TO, Lyngra M, et al. A one-year observational study of all hospitalized and fatal acute poisonings in Oslo: epidemiology, intention and follow-up. BMC Public Health. 2012; 12: 858.
5. Singh B, Unnikrishnan B. A profile of acute poisoning at Mangalore (South India). J Clin Forensic Med. 2006; 13(3): 112-6.
6. Hovda KE, Bjornaas MA, Skog K, Opdahl A, Drottning P, Ekeberg O, et al. Acute poisonings treated in hospitals in Oslo: A one-year prospective study (I): pattern of poisoning. Clin Toxicol. 2008; 46(1): 35-41.
7. Oguzturk H, Turtay MG, Pamukcu E, Ciftci O. Demographic features of acute drug poisoning admitted to Inonu University Hospital in Malatya, Turkey. Sci Res Essays. 2010; 5(18): 2761-7.
8. Warner M, Chen LH, Makuc DM, Anderson RN, Minino AM. Drug poisoning deaths in the United States, 1980-2008. NCHS Data Brief. 2011; (81): 1-8.
9. AbeerAl-Mutawa EA, Hedaya M, Koshy S. Intentional and Unintentional Drug Poisonings in Mubarak Al-Kabeer Hospital, Kuwait. J Pharma Care Health Sys. 2015; 2(139): 2376-0419.
10. Abdollahi M, Jalali N, Sabzevari O, Hoseini R, Ghanea T. A Restrospective Study of Poisoning in Tehran. J Toxicol Clin Toxicol. 1997; 35(4): 387-93.
11. Ergun B, Cevik AA, Ilgın S, Atlı O, Saracoglu A, Acar N, et al. Acute Drug Poisonings in Eskisehir, Turkey: A retrospective study. Turk J Pharm Sci. 2013; 10: 303-12.
12. Ahmadi A, Pakravan N, Ghazizadeh Z. Pattern of acute food, drug, and chemical poisoning in Sari City, Northern Iran. Hum Exp Toxicol. 2010; 29(9): 731-8.
13. Shadnia S, Soltaninejad K, Heydari K, Sasanian G, Abdollahi M. Tramadol intoxication: a review of 114 cases. Hum Exp Toxicol. 2008; 27(3): 201-5.
14. Sobhani A, Shojaii-Tehrani H, Nikpour E, Norouzi RN. Drug and chemical poisoning in northern Iran. 2000.
15. 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(9): 753-6.
16. Islambulchilar M, Islambulchilar Z, Kargar-Maher MH. Acute adult poisoning cases admitted to a university hospital in Tabriz, Iran. Hum Exp Toxicol. 2009; 28(4): 185-90.

17. Vatandoost H, Mirakbari S. Study of poisoning in adults at poison control centre, Loqman-e Hakeem hospital Tehran-Iran from april 25, 2000 to april 25 2001. Internet J Pharmacol. 2002; 1(2): 93-7.
18. Avsarogullari L, Senol V, Akdur O, Akin A, Durukan P, Ozkan S. Characteristics of acute adult poisonings in a university hospital emergency department in central Turkey: A three-year analysis. J Pak Med Assoc. 2012; 62(2): 129-33.
19. Fathelrahman AI, Ab Rahman AF, Mohd Zain Z. MS 04-044: demographic features of drug and chemical poisoning in northern Malaysia. Clin Toxicol. 2005; 43(2): 89-94.
20. 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(4): 371-80.
21. Mert E, Bilgin NG. Demographical, aetiological and clinical characteristics of poisonings in Mersin, Turkey. Hum Exp Toxicol. 2006; 25(4): 217-23.
22. Tufekci IB, Curgunlu A, Sirin F. Characteristics of acute adult poisoning cases admitted to a university hospital in Istanbul. Hum Exp Toxicol. 2004; 23(7): 347-51.
23. Liaw GW, Hung DZ, Chen WK, Lin CL, Lin IC, Kao CH. Relationship Between Acute Benzodiazepine Poisoning and Acute Pancreatitis Risk: A Population-Based Cohort Study. Medicine. 2015; 94(52): e2376.
24. Devi S. USA homes in on prescription drug abuse. Lancet. 2011; 378(9790): 473-4.
25. Lessenger JE, Feinberg SD. Abuse of prescription and over-the-counter medications. J Am Board Fam Med. 2008; 21(1): 45-54.
26. Gholami K, Shalviri G, Zarbakhsh A, Daryabari N, Yousefian S. New guideline for tramadol usage following adverse drug reactions reported to the Iranian Pharmacovigilance Center. Pharmacoepidemiol Drug Saf. 2007; 16(2): 229-37.
27. Lawrinson P, Ali R, Buavirat A, Chiamwongpaet S, Dvoryak S, Habrat B, et al. Key findings from the WHO collaborative study on substitution therapy for opioid dependence and HIV/AIDS. Addiction. 2008; 103(9): 1484-92.
28. Al-Jaser N, Epi MC, Awofeso N. Epidemiology of patients diagnosed with prescription and non-prescription drug overdose at the Riyadh Security Forces Hospital between January 2007 and December 2011. Curr Topic Public Health. 2013; 14(6): 593-622.
29. Gavrielatos G, Komitopoulos N, Kanellos P, Varsamis E, Kogeorgos J. Suicidal attempts by prescription drug overdose in the elderly: A study of 44 cases. Neuropsychiatr Dis Treat. 2006; 2(3): 359-63.
30. Kavalci C, Demir A, Arslan ED, Yilmaz F, Durdu T, Yel C, et al. Adult poisoning cases in Ankara: capital city of Turkey; 2013.

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