

## Acute Poisoning Cases Admitted to a Tertiary Hospital Emergency Department: A Prospective and Discriptive Study

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### Abstract

**Background:** Acute poisoning, characterized by exposure to toxic substances for less than 24 hours, is a significant public health issue worldwide. Factors leading to poisoning vary by region, customs, and socioeconomic level. To prevent this, countries and regions should analyze etiological and demographic characteristics of poisoning and take precautions. This study aimed to determine demographic, etiologic, and clinical characteristics of acute poisoning cases.

**Material and Method:** The study analyzed sociodemographic factors, clinical outcomes, and the causes of poisoning. Patients who attempted suicide were consulted by psychiatry at the end of their follow-up. The data was analyzed using Windows SPSS 21.0, with  $p < 0.05$  considered statistically significant.

**Result:** A study of 236,464 patients admitted to the adult emergency department within a 6-month period found that 432 (0.18%) were diagnosed with acute poisoning. The most common cause of acute poisoning cases was suicide attempts. The most common exposure agents were analgesics and antidepressants. The proportion of females (75.2%) in suicide attempts and males (89.5%) in abuse was statistically significantly higher. Of the 286 patients with suicide attempts, 212 (74.1%) underwent psychiatric consultation in the emergency department. The predominant psychosocial factors contributing to suicide attempts were familial issues and socioeconomic insufficiency. The overall mortality rate in patients followed up for acute poisoning was 0.46%.

**Conclusion:** The most common cause is intentional poisoning, particularly suicidal. Therapeutic drugs and food poisoning are the most common toxic agents. Family problems and socioeconomic inadequacy are common reasons for suicide attempts.

**Keywords:** Acute poisoning, epidemiology, emergency department, suicide.

### Introduction

Poisoning remains a common cause of morbidity and mortality worldwide (1). Acute poisoning is characterized as exposure to a toxic substance for a short period of time, typically less than 24 hours (2). In many parts of the world, acute poisoning is a big public health problem that can be avoided and leads to illness and death (3,4). In the past, statistics on patients poisoned in emergency departments in Turkey were quite scarce. However, improved records and data on acute or emergency poisoning cases through the Turkish Statistical Institute (TUIK) and the 114 National Poison Call Center have helped us understand the importance of this health problem (5,6). In many countries, acute poisoning due to drugs and chemicals is among the most common reasons for admission to emergency departments. In the United States of America (USA), a developed country, the annual incidence of poisoning cases has been reported at 0.68 (7). In studies conducted in our country on acute poisonings, the annual incidence of admissions to emergency departments due to poisoning was found to be between 0.7% and 10.1% (8-12).

The factors leading to poisoning may vary according to the region of residence, the customs and traditions of the society, and the socioeconomic level. For this reason, each country and even each region should conduct studies analyzing the etiological and demographic characteristics of poisoning and take precautions. Obtaining the latest up-to-date information on acute poisoning is also important for the planning of health and education services.

The aim of this study was to determine the demographic, etiologic, and clinical characteristics of acute poisoning cases admitted to the Emergency Department of Kayseri Education and Research Hospital (KEAH), to determine the risk factors leading to poisoning, and to determine the follow-up periods of these cases in the emergency department and intensive care unit.

### Material and Method

This prospective study included patients aged 18 years and older who were admitted to the emergency department of KEAH with acute poisoning during the 6-month period

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between April 15, 2014 and October 15, 2014. This observational cross-sectional study was initiated with the decision of the Education Planning Committee of Kayseri Training and Research Hospital dated 07/04/2014 under number 28.

### Study Design

This descriptive study was planned prospectively to include cases of acute poisoning in individuals aged 18 years and older who were admitted to the KEAH Emergency Department. The resident physicians entered patient data into the pre-established database. Patients who consented to participate in the study were included in the study. In addition, patients with incomplete data were excluded from the study. The study was conducted in accordance with the ethical rules of the helsinki declaration. This study is a publication produced from a thesis.

### Analyzed Data

The study examined various sociodemographic factors of the patients in the database, including age, gender, educational attainment, marital status, occupation, and monthly family income level, as well as the specific details regarding the nature and type of intoxication. The evaluation of the patients' level of consciousness upon their arrival at the emergency department was conducted using the Glasgow Coma Scale (GCS). This study assessed acute poisoning clinical outcomes (discharge, admission to the critical care unit or ward, transfer to another hospital, voluntary departure from the clinic, or death). Mortality rates and discharge times from the intensive care unit were also analyzed in the study. In determining the type of poisoning, information was obtained from the patients themselves or their relatives who were present at the time of admission to the emergency department and the causes of poisoning due to suicide, accidental ingestion or abuse or addiction of toxicological substances were investigated. Patients who attempted suicide were consulted by psychiatry at the end of their emergency department follow-up. In this way, it was possible to distinguish between real suicide attempts and impulsive suicide attempts. Biopsychosocial factors underlying suicidal ideation were also investigated.

### Statistics

The data were analyzed using the Windows SPSS 21.0 statistical package program. In descriptive statistics, qualitative data were expressed as rates and percentages. Chi-square test was used to compare categorical variables between two groups, one-way analysis of variance (Anova, F test) was used to compare more than two group averages, and Tukey HSD method was used as 'post-hoc' method in multiple comparisons made after analysis of variance. Normally distributed quantitative data were expressed as mean±Standard deviation; non-normally distributed

quantitative data were expressed as median (minimum-maximum). Kolmogorov-Smirnov test was performed for normality test. All data were analyzed at 95% confidence interval and  $p < 0.05$  was considered statistically significant.

## Results

Among a total of 236,464 patients admitted to the adult emergency department within a 6-month period, 432 (0.18%) patients aged 18 years and over were followed up with a diagnosis of acute poisoning. Demographic data for 432 patients is shown in Table 1. In our study, 150 (34.7%) of

**Table 1:** Sociodemographic characteristics of poisoning cases

Variables	Count (N:432)	Percentage (%)
<b>Sex</b>		
Male	150	34.7
Female	282	65.3
<b>Age Groups (years) - mean age: 30.93±12.88</b>		
18-25	194	44.9
26-35	105	24.3
36-44	70	16.2
45-54	34	7.9
55-64	19	4.4
65-81	10	2.3
<b>Marital status</b>		
Married	264	61.1
Single	146	33.8
Widowed/divorced	22	5.1
<b>Education Status</b>		
Illiterate	20	4.6
Primary (elementary-middle school)	281	65
High School	108	25
University	23	5.3
<b>Place of Residence</b>		
City	388	89.8
District	25	5.8
Town	7	1.6
Village	12	2.8
<b>Job Status</b>		
Working	126	29.2
Unemployed	66	15.3
Housewife	175	40.5
Retired	18	4.2
Student	40	9.3
Military Personnel	7	1.6
<b>Monthly income level (TL) mean income: 1239.76± 709.58</b>		
0-950	134	31.0
951-1900	217	50.2
1901-3800	77	17.8
3801-5000	4	0.9

the patients admitted with the diagnosis of acute poisoning were male, and 282 (65.3%) were female. The mean age of the patients was  $30.93 \pm 12.88$  years. Considering the age distribution of the patients, the highest number of applications was found in the 18–25 age group, with a rate of 44.9%. Most of the applications were made by those living in the city center, with a rate of 89.8%. When the cases were analyzed according to marital status, it was observed that a higher proportion of the patients were married (61.1%). In addition, according to educational status, the majority of the patients (65%) were primary and secondary school graduates. When compared according to the monthly income level of the household, it was found that the highest number of visits to the emergency department were among patients with low income levels (the minimum wage was calculated as 950 TL

The manifestation and causes of acute poisoning cases are summarized in Table 2. Accordingly, out of 432 patients, 286 (66.2%) were poisoned due to suicide attempts, 127 (29.4%) due to accidents, 19 (4.4%) due to abuse or addiction, 273 (63.2%) due to drugs, 19 (4.4%) due to chemical gas, 23 (5.3%) due to pesticides, 25 (5.8%) due to corrosive agents, 53 (12.3%) due to food, and 39 (9.3%) due to other causes.

The median Glasgow Coma Scale (GCS) value of the patients upon their arrival at the emergency department was 15, with a minimum value of 4 and a maximum value of 15. The number of intoxications with a single drug was 176 (64.5%), and the number of multiple drug exposures was 97 (35.5%) (N = 273). The most common cause and percentage of poisonings are summarized in Table 3. The most common exposure agents were analgesics with a rate of 31.3% (NSAIDs 21.6%; paracetamol 9.7%) and antidepressants with a rate of 22.2%. Carbon monoxide (CO) was identified as the causal agent in all 19 patients (100.0%) who were affected by chemical gas poisoning. Among the cases of acute pesticide poisoning, a majority of 60.9% (n=14) were attributed to insecticides, while 30.4% (n=7) were caused by rodenticides. Herbicides accounted for a smaller proportion of cases at 8.7% (n=2). Among 15 patients poisoned with

**Table 3:** The most common agents and their percentages in acute poisonings

Type of Poisoning		Most common agent	Percent(%)
Drugs	Analgesics (n:176)	Analgesics	%31.3
	Paracetamol+NSAIDs (n:97)	Paracetamol + NSAIDs	%13.40
Chemical Gas (n:19)		Carbon Monoxide	% 100.0
Pesticides (n: 23)		Organophosphate	% 34.78
Corrosive Agent (n:25)		Bleach	% 64.0
Food (n:53)		mushrooms	% 58.5
Other* (n: 39)		Scorpion bite/sting	% 20.51

\*(15 patients with poisonous animal bites or stings, 9 patients with drugs, 7 patients with alcohol, and 8 patients with more than one type of exposure)

insecticides, the causative organophosphate was found in 8 patients (53.3%). The predominant cause of foodborne illness was attributed to the consumption of mushrooms, accounting for 58.5% of reported cases. Among the cases of poisoning involving caustic compounds, it was observed that 16 patients, including 64% of the total, experienced hazardous exposure specifically due to bleach. In the venomous animal bites/stings group, scorpion stings (53.3%) were the most common animal contact poisoning. Besides, ethanol was found to be the most common agent in 6 out of 7 patients (85.7%) with alcohol-only poisoning. Out of the 11 individuals who were admitted to the emergency department due to illicit drug use, it was seen that 6 patients (54.5%) reported the use of synthetic cannabis, specifically bonzai and its derivatives. Additionally, 3 patients (27.3%) acknowledged the use of cannabis, while 2 patients (18.2%) reported the use of heroin.

When gender was compared according to poisoning types, it was found that the proportion of females (75.2%) in suicide attempts and males (89.5%) in abuse was statistically significantly higher ( $p < 0.001$ ). In addition, when the age, GCS and length of stay in the intensive care unit were compared according to the type of intoxication, the mean age was found to be lower in the suicide attempt group than in the accidental and substance abuse group, and the mean GCS was found to be lower in the substance abuse group. And this difference was found to be statistically significant ( $p < 0.001$ ). On the other hand, no significant difference was found when the types of poisoning were compared according to the duration of intensive care unit stay ( $p = 0.47$ ). This relationship is shown in table 4.

Of the 286 patients with suicide attempts, 212 (74.1%) underwent psychiatric consultation in the emergency department. As a result of psychiatric consultation, 71 (33.5%) and 141 (66.5%) of the 212 patients were evaluated as real and impulsive suicide attempts, respectively. The predominant psychosocial factors contributing to suicide attempts were identified as familial issues (57.3%) and socioeconomic insufficiency (9.1%). Among the suicide attempts evaluated by a psychiatrist in the emergency

**Table 2:** Types and manifestation of acute poisoning

		Count	Percent (%)
Types	Drugs	273	63.2
	Chemical Gas	19	4.4
	Pesticide	23	5.3
	Corrosive Agent	25	5.8
	Nutrients	53	12.3
	Other*	39	9.3
	Total	432	100.0
Manifestation	Suicide attempt	286	66.2
	Accident	127	29.4
	Abuse/addiction	19	4.4

**Table 4:** Comparison of gender, age, GCS, length of stay in intensive care unit according to the type of intoxication

Variables		Type of poisoning				P value
		Accidental	Abuse	Total		
Suicide Attempt		*mean ± SD	*mean ± SD	*mean ± SD		
Gender n (%)	Male	71 (24.8)	62 (48.8)	17 (89.5)	150 (34.7)	<0.001**
	Female	215 (75.2)	65 (51.2)	2 (10.5)	282 (65.3)	
*Age		27.66 ± 9.92	37.59 ± 15.78	35.63 ± 12.69	30.93 ± 12.88	<0.001***
*GCS		14.87 ± 0.72	14.99 ± 0.08	12.89 ± 2.94	14.82 ± 0.94	<0.001***
*Length of Stay in the Intensive Care Unit		3.06 ± 1.16	2.73 ± 0.45	3.50 ± 2.12	3.00 ± 1.07	0.47***

\*mean±SD, \*\*chi-square analysis, \*\*\*One-way ANOVA analysis

department (n=212), 45 patients (21.22%) were under psychiatric follow-up in the last 6 months. In addition, 34 of 212 patients (16.03%) had suicidal ideation. The rate of actual suicide attempts was higher than impulsive suicide attempts in patients with suicidal ideation who were under psychiatric follow-up in the last 6 months, and this difference was statistically significant (p<0.001). This relationship is shown in table 5. Finally, 47.9% of the patients were discharged, 23.4% left the emergency department voluntarily before the end of the follow-up period, 13% were admitted to in-hospital wards, 8.6% were admitted to in-hospital intensive care units, 6.9% were referred to the intensive care units of another institution and 1 patient (0.2%) died. Of the 67 patients hospitalized in the intensive care unit due to poisoning, 66 (98.5%) were discharged from the unit, and 1 patient (1.5%) also died. The overall mortality rate (n=2) in patients followed up for acute poisoning was 0.46%.

## Discussion

In studies conducted in different centers, there are differences in the rates of poisoning cases admitted to the emergency department (13,14). This is due to the fact that in the regions

**Table 5:** Comparison of gender, age, GCS, length of stay in intensive care unit according to the type of intoxication

Variables		Real n (%)	Impulsive n (%)	Total n (%)	P value
Psychiatric follow-up in the last 6 months	Yes	28 (62.22)	17 (37.78)	45 (100.0)	<0.001
	No	43 (25.75)	124 (74.25)	167 (100.0)	
	Total	71 (33.49)	141 (66.51)	212 (100)	
Suicidal thoughts again	Yes	30 (88.23)	4 (11.77)	34(100.0)	<0.001
	No	41(23)	137 (77)	178 (100.0)	
	Total	71(33.49)	141 (66.51)	212 (100)	

where hospitals are established, the sociodemographic characteristics, customs, and traditions of the people in that region differ between regions and even countries. The annual incidence of acute poisoning cases admitted to emergency rooms in Turkey varies between 0.7% and 2.4% (8-12), according to studies published in the literature. This rate was determined to be 0.18% in our study. In comparison to other research conducted in Turkey, this rate was found to be low. We believe that the fact that green area patients make up the majority of annual emergency department visits (50.7%) and that the emergency department is used as an outpatient clinic has a significant impact on this. In studies conducted in Turkey, it is observed that poisoning cases are mostly in women and young people (15-17). Similar results were also obtained in our study. In addition, when the age distribution of the patients was analyzed, it was observed that most of the applications were in the 18-25 age group. Consistent with findings from previous research conducted in our country and neighboring Iran (18-20), which are considered developing nations, the majority of acute poisoning cases in our study consisted of individuals residing in urban areas (89.8%). Furthermore, a significant proportion of these cases were primary school graduates (65%), individuals with low income levels (81.2%), married individuals (61.1%), and housewives (40.5%). In our study, the most common agent taken for poisoning was high dose drug intake (63.2%). This rate is similar to the results of studies conducted in other regions of Turkey (21,22). According to the reports of other country studies, drugs were found to be the most commonly ingested agent in acute poisonings (13,14,23). However, drugs may not be the most common agent in countries with a high rate of agriculture. For example, in a study conducted in Thailand, pesticides (41.5%) were found to be the most common agent (24). In our study, analgesics (NSAIDs 21.6%; paracetamol 9.7%) and antidepressants (22.2%) were the most common agents in single drug poisonings, respectively. The ranking remains unchanged for all drug poisonings, including combinations. We think that this is due to the easy access and widespread use of analgesics and antidepressants. Unlike benzodiazepines, antidepressants, which can be dispensed from pharmacies even without a prescription, are considered to be the most frequently used agents in acute poisonings due to their unintentional consumption as 'feel-good' drugs. For this reason, we believe that trainings should be provided to raise awareness among the public about these drugs and their side effects in order to be aware of the side effects that can be caused by high doses of these drugs, especially paracetamol, which seems innocent, and we strongly recommend that antidepressant drugs should be given by pharmacies against prescription in order not to be consumed off-label. While paracetamol was the most common analgesic agent in some studies conducted in some regions of Turkey (9,11), NSAIDs were found to be the most common agent in some studies including our study

(8,22,25). In our study, the mortality rate was found to be 0.46 % in patients admitted with acute poisoning. Eddlestone et al. reported that mortality rates due to poisoning varied between 0% and 50% (26). In the same study, the reasons for the wide range of mortality rates were shown to be the severity of the poisoning, the ingestion of lethal or nonlethal agents and the fact that serious cases resulting in death occurred before hospitalization. In our study, deaths were due to methanol (abuse) and organophosphate ingestion (suicide attempt) and the gender of the patients was male in both deaths.

When the biopsychosocial reasons for suicide attempts were analyzed, familial problems were the most common reason (57.3%). It has been reported that 80%-90% of the cases of self-harm in England are between 80% and 90% and 50% of these cases are due to family problems (27). Furthermore, in a multicenter study conducted by Schmidtke et al. investigating the sociodemographic characteristics of suicide attempts in European countries, it was reported that suicide attempts were mostly in the low social class; were most common in women aged 15-25 years and least common in the group aged 55 years and older; were mostly among the unmarried (singles and widows) and in cases with low education level; unemployment in men and economic independence in women was an important risk factor and previous suicide attempts were common in suicide attempt cases (28). Given that the majority of the participants in our study were married individuals and housewives, 66.5% of whom attempted impulsive suicide, it is reasonable to assume that the suicidal act was motivated by psychological distress due to household problems, as well as a desire to escape from adverse circumstances or to obtain secondary benefits. In addition, socioeconomic inadequacy was the second most common cause of suicide attempts. Upon comparing the preexisting chronic diseases or addictions of individuals who had attempted suicide with the nature of their suicide attempts, it was noted that those with underlying psychiatric disorders, substance and alcohol dependencies, and chronic illnesses exhibited a higher frequency of real suicide attempts. Our findings are consistent with previous studies (28,29). Besides, Schmidtke et al. reported that an average of 15% of suicide attempters under observation made one or more suicide attempts (28). In our study, similar to the literature, it was found that 16.8% of suicide attempters continued to have suicidal ideation. Therefore, in order to minimize the rate of suicide attempts in the future, such patients should definitely be consulted by psychiatry in emergency departments and treatment and follow-up of the patients should be planned.

### Limitations

The biggest limitation of this study is that it was a single-center study and the study period was short (6 months). The fact that the study period did not include the winter months

may have caused the rates of some types of poisoning (CO poisoning) to be lower. In this respect, it may not be appropriate to say that our findings fully reflect the rates of acute poisoning in the general population.

## Conclusion

The present data provide additional information on the epidemiology of acute poisoning in Kayseri province. The findings showed that the incidence of acute poisoning was 0.18%. Females outnumbered males and poisoning was most common in young adults aged 18-25 years. We also observed that most cases of poisoning were intentional, especially suicidal. Our study showed that therapeutic drugs were the most common group of toxic agents, followed by food poisoning. In our study, acute poisoning cases were mostly urban dwellers, primary school graduates, people with low income, married and housewives. CO poisoning is still a serious problem in Turkey, especially in winter. Scorpion stings are the most common type of venomous animal bites or stings. In this respect, protective measures should be taken. Alcohol and substance abuse is still a serious problem in Turkey. In our study, one out of two deaths in acute poisoning cases is due to alcohol poisoning. Family problems and socioeconomic inadequacy were found to be the most common biopsychosocial reasons for suicide attempts. In order to reduce the rate of suicide attempts, risk factors should be identified through multicenter studies and measures should be taken accordingly; family support lines and social education programs should be established to minimize family problems.

## References

1. Frithsen IL, Simpson WM Jr. Recognition and management of acute medication poisoning. *Am Fam Physician*. 2010 Feb 1;81(3):316-23. PMID: 20112890.
2. 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 Aug 29;8(8):e021881. doi: 10.1136/bmjopen-2018-021881. PMID: 30158226; PMCID: PMC6119445.
3. Senarathna L, Buckley NA, Jayamanna SF, Kelly PJ, Dibley MJ, Dawson AH. Validity of referral hospitals for the toxicovigilance of acute poisoning in Sri Lanka. *Bull World Health Organ*. 2012 Jun 1;90(6):436-443A. doi: 10.2471/BLT.11.092114. Epub 2012 Feb 28. PMID: 22690033; PMCID: PMC3370361.
4. Mazer-Amirshahi M, Sun C, Mullins P, Perrone J, Nelson L, Pines JM. Trends in Emergency Department Resource Utilization for Poisoning-Related Visits, 2003-2011. *J Med Toxicol*. 2016 Sep;12(3):248-54. doi: 10.1007/s13181-016-0564-6. Epub 2016 Jun 24. PMID: 27342464; PMCID: PMC4996794.
5. [https://hsgm.saglik.gov.tr/depo/Yayinlarimiz/Raporlar/Ulusal\\_Zehir\\_Danisma\\_Merkezi\\_UZEM\\_Raporlari\\_2014-2020\\_Yillarr.pdf](https://hsgm.saglik.gov.tr/depo/Yayinlarimiz/Raporlar/Ulusal_Zehir_Danisma_Merkezi_UZEM_Raporlari_2014-2020_Yillarr.pdf)

6. Göney G. 1923'ten Günümüze Türkiye'de Zehirlenme Oranları Ve Nedenlerinin Analizi. *SDÜ Tıp Fakültesi Dergisi*. 2020; 27(Özel Sayı 1): 1-6.
7. Mowry JB, Spyker DA, Cantilena LR, JR, Mcmillan N, Ford M. 2013 Annual Report of the American Association of Poison Control Centers ' National Poison Data System (NPDS): 31st Annual Report. *Clinical Toxicology (2014)*, 52, 1032–1283. 2014 p. 1032–283.
8. Özköse Z, Ayoğlu F. Etiological and demographical characteristics of acute adult poisoning in Ankara, Turkey. *Hum Exp Toxicol*. 1999;18(August):614–8.
9. Goksu S, Yıldırım C, Kocoglu H, Tutak A, Oner U. Characteristics of Acute Adult Poisoning in Gaziantep, Turkey. *Clin Toxicol*. 2002 Jan;40(7):833–7.
10. Pekdemir M, Kavalcı C, Durukan P, Yıldız M. Acil Servisimize Başvuran Zehirlenme Olgularının Değerlendirilmesi. *Turk J Emerg Med*. 2002;2(2):36–40.
11. Tüfekçi İB, Çurgunlu A, Şirin F. Characteristics of acute adult poisoning cases admitted to a university hospital in Istanbul. *Hum Exp Toxicol*. 2004 Jul 1;23(7):347–51.
12. Cengiz M, Baysal Z, Ganıdaglı S, Altındag A. Characteristics of poisoning cases in adult intensive care unit in Sanliurfa, Turkey. *Saudi Med J*. 2006;27(4):497–502.
13. McCaig LF, McCaig L, Burt CW. Poisoning-Related Visits to Emergency Departments in the United States, 1993–1996. *Clin Toxicol*. 1999 Jan;37(7):817–26.
14. Ponampalam R, Tan HH, Ng KC, Lee WY, Tan SC. Demographics of toxic exposures presenting to three public hospital emergency departments in Singapore 2001–2003. *Int J Emerg Med*. 2009 Apr;2(1):25–31.
15. Ayan M, Basol N, Karaman T, Tas U, Esen M. Retrospective Evaluation of Emergency Service Patients with Poisoning: a 20 Month Study. *J Acad Emerg Med*. 2012 Mar 1;11:146–50.
16. Çetin NG, Beydilli H, Tomruk Ö. Acil servise başvuran intoksikasyon olgularının geriye dönük analizi. *SDÜ Tıp Fak Derg*. 2004;11(4):7–9.
17. Sahin HA, Sahin I, Arabaci F. Sociodemographic factors in organophosphate poisonings: a prospective study. *Hum Exp Toxicol*. 2003;22(7):349–53.
18. Islambulchilar M, Islambulchilar Z, Kargar-Maher MH. Acute adult poisoning cases admitted to a university hospital in Tabriz, Iran. *Hum Exp Toxicol*. 2009 Apr;28(4):185–90.
19. Mert E, Bilgin N. Demographical, aetiological and clinical characteristics of poisonings in Mersin, Turkey. *Hum Exp Toxicol*. 2006;25(4):217–23.
20. Güloğlu C, Kara I. Acute poisoning cases admitted to a university hospital emergency department in Diyarbakir, Turkey. *Hum Exp Toxicol*. 2005;24(2):49–55.
21. Baydin A, Yardan T, Aygun D, Doganay Z, Nargis C, Incealtın O. Retrospective evaluation of emergency service patients with poisoning: A 3-year study. *Adv Ther*. 2005;22(6):650–8.
22. Seydaoğlu G, Satar S, Alparslan N. Frequency and mortality risk factors of acute adult poisoning in Adana, Turkey, 1997–2002. *Mt Sinai J Med*. 2005;72(6):393–401.
23. Hawton K, Fagg J, Simkin S, Mills J. The epidemiology of attempted suicide in the Oxford area, England (1989–1992). *Crisis*. 1994;15(3):123–35.
24. Wananukul W, Sriapha C, Tongpoo A, Sadabthammarak U, Wongvisawakorn S, Kaojarern S. Human poisoning in Thailand: The Ramathibodi Poison Center's experience (2001–2004). *Clin Toxicol (Phila)*. 2007;45(5):582–8.
25. Akkose S, Fedakar R, Bulut M, Çebiçi H. Acute poisoning in adults in the years 1996–2001 treated in the Uludag University Hospital, Marmara Region, Turkey. *Clin Toxicol*. 2005;43(2):105–9.
26. Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. *QJM*. 2000;93(11):715–31.
27. Hawton K. Deliberate self-harm. *Medicine (Baltimore)*. 2004;32:38–42.
28. Schmidtke A, Bille-Brahe U, DeLeo D, Kerkhof A, Bjerke T, Crepet P, et al. Attempted suicide in Europe : rates, trend. S and sociodemographic characteristics of suicide attempters during the period 1989–1992. Results of the WHO / EURO Multicentre Study on Parasuicide. *Acta Psychiatr Scand*. 1996;93:327–38.
29. Zebley BD, Ferrando SJ. Suicide-related events in patients treated with antiepileptic drugs. *N Engl J Med*. 2010;363(6):542–51.