

ANALYSIS OF ACUTE ADULT POISONING CASES AMONG PATIENTS ADMITTED TO THE EMERGENCY DEPARTMENT IN BURSA, TURKEY

¹Celaleddin DEMİRCAN, ²Ferda KAHVECİ, ³Zülfi Engindeniz, ⁴Murat KIYICI, ⁵Nermin kelebek GİRGİN, ⁶İlker ERCAN, ⁷Hikmet TEKÇE, ⁸Fatma ÖZDEMİR, ⁹Gürayten ÖZYURT

ABSTRACT:

Purpose: The aim of this study was to define the epidemiological features such as age, sex, toxic substance, suicide, and mortality rates of the adult poisoning cases among patients admitted to the Emergency Department (ED) of Uludağ University Medical Faculty Hospital.

Materials and Methods: Records of acute adult poisoning cases at the ED within a one-year period (June 1, 2002 - May 31, 2003) were evaluated retrospectively. Data were compared to those of similar studies from Turkey and around the world.

Results: In total 430 (1.96%) of 21,934 patients admitted to the ED during the study period suffered acute poisoning. Of these patients 259 (60.2%) were women and 171 (39.8%) were men and the mean age of the patients was 29.9. Patients were exposed to different types of toxic substances: drugs (47.4%), pesticides (10.7%), toxic gases (10%), corrosives (6.5%), alcohol (3.5%), food (15.8%), toxic substances of animal origin (3.0%), and others (3.0%). In all, 29.8% of the patients were admitted to hospital, 22.3% were transferred to other hospitals, and 47.9% were discharged from the ED, and the overall mortality rate was 1.2%. In addition, 54.9% of the poisonings were suicide attempts and within this group the women to men ratio was 2.2 and the most common toxic substance was a drug (85.2%).

Conclusion: Our results were similar to those of previous studies from this country as acute poisonings are more common in women and younger ages, most of them were suicide attempts, and the mortality rate was low. Our transfer rate was high and this may necessitate the organization of short-term observation of these patients.

Key words: Poisoning, Emergency Department, Suicide

ACİL SERVİSE BAŞVURAN ERİŞKİN AKUT ZEHİRLENME OLGULARININ ANALİZİ

ÖZ:

Amaç: Bu çalışmada Uludağ Üniversitesi Tıp Fakültesi Hastanesi acil servisine başvuran erişkin akut zehirlenmeli hastalardaki yaş, cinsiyet özellikleri, toksik madde türleri, intihar girişimi ve mortalite oranları hakkında epidemiyolojik bilgilerin edinilmesi amaçlandı.

Gereç ve Yöntem: 1.6.2002 ile 31.5.2003 tarihleri arasındaki 1 yıllık sürede acil servise başvuran akut zehirlenmeli hastaların dosyaları retrospektif olarak incelendi. Veriler ülkemizdeki ve dünyadaki benzer çalışmaların sonuçları ile karşılaştırıldı.

Bulgular: Bu süre içinde acil servise başvuran 21934 hastanın 430'unda (%1,96) akut zehirlenme vardı. Bu hastaların 259'u (%60,2) kadın, 171'i (%39,8) erkek ve ortalama yaş:29,9, maruz kalınan toksik maddeler ve oranları; ilaçlar:%47,4, pestisidler:%10,7, toksik gazlar:%10,0, koroziv madde: %6,5, alkol:%3,5, gıda:%15,8, hayvansal kaynaklı:%3,0 ve diğerleri:%3,0 idi. Hastaların %29,8'i yatırılmış, %22,3'ü başka hastanelere sevk edilmiş, %47,9'u ise acil servisten taburcu edilmiş ve mortalite oranı %1,2 idi. Zehirlenmelerin %54,9'u intihar amaçlı olup bu hastalarda kadın/erkek oranı: 2,2, en sık alınan toksik madde türü ilaçlardı (%85,2).

Sonuç: Akut zehirlenmelerin kadınlarda ve genç yaşlarda daha sık görülmesi, ilaçların en sık neden olan toksik madde türü olması, zehirlenmelerin çoğunun intihar amaçlı olması ve mortalite oranının düşüklüğü ülkemizdeki diğer çalışmaların sonuçları ile benzer bulunmuştur. Diğer hastanelere sevk oranımız daha yüksek olup bu durum hastanemizde bu hastaların kısa süreli izlemi için uygun organizasyonun yapılmasını gerektirir.

Anahtar Kelimeler: Zehirlenme, Acil Servis, İntihar

INTRODUCTION

Acute poisonings may occur via various routes (oral, parenteral, inhalational, transdermal) with various substances (drugs, pesticides, corrosives, alcohol, toxic gases, food, plant or animal origin) and with various causes (suicidal, accidental, and criminal)¹. Features of acute poisonings may vary according to the geographic, cultural, and socioeconomic parameters of societies and may differ with age and gender²⁻⁵. Close follow-up of epidemiological data on acute poisonings not only improves the management of acute poisonings but also contributes to the planning of a better public health response and preventive strategies^{6,7}. The sharp decline in the suicide rate observed after the reduction of the number of paracetamol tablets per commercial box in the UK was a good example of such a response⁷.

Uludağ University Medical Faculty Hospital is located in Bursa, a major metropolitan city in the South Marmara region of Turkey, and it serves as a tertiary care center for a population of about 2,200,000 people with the surrounding cities. The aim of this study was to gather demographic features and details of the poisoning in adult victims of poisoning admitted to the ED of Uludağ Hospital and to compare our results with those in the literature from different regions of Turkey and other countries⁸.

MATERIALS AND METHODS

Patients aged 15 or above admitted to the ED of Uludağ Hospital with acute poisoning within the 1 year period between June 1, 2002, and May 31, 2003, were included in the study. Data were obtained from retrospective evaluation of patients' records. Toxic substances were grouped as follows: drugs, pesticides (insecticides, rodenticides, organophosphates, carbamates etc.), toxic gases (carbon monoxide (CO), liquid petroleum gas (LPG)), corrosive substances, alcohol (ethyl alcohol, methyl alcohol), food (mushrooms and others), animal origin (snake, scorpion and other bites and envenomations), and others (inhalational injuries due to volatile substances and unidentified intoxications). Demographic features of the patients such as age and gender, data on intoxication and clinical course such as types of toxic substances, whether it was a suicide attempt, time interval between poisoning and ED admittance, admission time interval, ED length of stay, hospitalization, intubation, and mortality rates were recorded.

Statistical analyses were done with SPSS 13.0 for Windows. Pearson's chi square, Fischer's exact chi square, and binominal tests were used in the comparison of categorical variables. Groups were compared with Mann-Whitney U test according to the distribution pattern of variables. A p value less than 0.05 was accepted as statistically significant. Values were expressed as means ± standard deviation.

¹Uludağ University Medical Faculty, Department of Internal Medicine, Emergency Internal Medicine Unit, Bursa, Turkey

²Uludağ University Medical Faculty, Department of Anaesthesiology and Reanimation, Bursa, Turkey

³Uludağ University Medical Faculty, Department of Emergency Medicine, Bursa, Turkey

⁴Uludağ University Medical Faculty, Department of Gastroenterology, Bursa, Turkey

⁵Uludağ University Medical Faculty, Department of Biostatistics, Bursa, Turkey

RESULTS

Within the 1-year study period 430 (1.96%) of 21,934 adult patients admitted to our ED were found to have acute poisoning. Mean age of the patients was 29.9 ± 13.3 (28.0 ± 12.0 for women and 32.7 ± 14.6 for men), median age was 26, and age range was 15 to 81. The mean age of women was significantly lower than that of men ($p < 0.05$). Basic epidemiological features of the patients are given in Table 1. Distribution of age and gender according to toxic substance type is shown in Table 2. Distribution of ED admission, hospitalization, and mortality rates in respect to toxic substance types is shown in Table 3.

Table 1. Epidemiologic features of acute poisoning patients

Number of patients (%)	
Gender	
-Women	259 (60.2%)
-Men	171 (39.8%)
Age groups	
-15-24	187 (43.5%)
-25-34	111 (25.8%)
-35-44	59 (13.7%)
-45-54	41 (9.5%)
-≥ 55	32 (7.4%)
Seasonal distribution	
-Winter	105 (24.4%)
-Spring	82 (19.1%)
-Summer	133 (30.9%)
-Autumn	110 (25.6%)
Poisoning - admittance time interval	
-< 2 hours	76 (17.7%)
-2-6 hours	283 (65.8%)
-≥ 6 hours	71 (16.5%)
Admission time interval	
-08:00-16:00	109 (25.3%)
-16:00-24:00	177 (41.2%)
-24:00-08:00	144 (33.5%)
ED length of stay	
-< 2 hours	122 (28.4%)
-2-6 hours	246 (57.2%)
-≥ 6 hours	62 (14.4%)
Route of poisoning	
-Oral	360 (83.7%)
-Inhalational	57 (13.3%)
-Skin	13 (3.0%)
Cause of Poisoning	
-Suicidal	236 (54.9%)
-Accidental	194 (45.1%)
Type of toxic substance	
-Drugs	204 (47.4%)
-Pesticides	46 (10.7%)
-Toxic gases	43 (10.0%)
-Corrosives	28 (6.5%)
-Alcohol	15 (3.5%)
-Food	68 (15.8%)
-Animal origin	13 (3.0%)
-Others	13 (3.0%)
Interventions performed	
-Gastric lavage	171 (39.7%)
-Activated charcoal	142 (33%)
-Antidote	34 (7.9%)
-Hemodialysis	2 (0.4%)
-Intubation	21 (4.8%)
-Mechanical ventilation	19 (4.4%)

Acute poisonings were more common in women (women to men ratio: 1.5), in the age group of 15-24 years, and during summer. The most common time interval for ED admittance was 16:00 to 24:00. The most common route of poisoning was oral and the majority of the cases were suicide attempts. Furthermore, 43.5% of the patients were under 25 years of age, 61.4% were under 30 years of age, and 69.3% were under 35 years of age. The mean time interval between poisoning and ED admission was 227 ± 120 min (range: 30-950 min, median: 210 min) and 83.5% of the patients were admitted to the ED within the first 6 h of poisoning. Furthermore, 167 (38.8%) of the patients had been transferred from another center. Mean length of ED stay was 205 ± 162 min (range: 30-1020 min, median: 150 min) and 85.6% of the patients left the ED within 6 h. The most common type of poisoning was with drugs.

Table 2. Distribution of toxic substance type according to age and gender

Toxic substance	Number of patients	Women	Men	Mean Age	Median Age	Age Range
Drugs	204	147 (72.1%)	57 (27.9%)	25.1 ± 9.4	22	15-58
Pesticides	46	23 (50.0%)	23 (50.0%)	32.4 ± 14.7	28	16-81
Toxic Gases	43	22 (51.2%)	21 (48.8%)	34.4 ± 14.5	30	15-73
Corrosives	28	13 (46.4%)	15 (53.6%)	42.1 ± 15.8	41.5	15-72
Alcohol	15	2 (13.3%)	13 (86.7%)	24.6 ± 10.6	21	17-50
Food	68	42 (61.8%)	26 (38.2%)	34.9 ± 15.7	34	15-76
Animal origin	13	6 (46.2%)	7 (53.8%)	30.7 ± 8.4	30	19-44
Others	13	4 (30.8%)	9 (69.2%)	30.7 ± 11.8	26	19-57

Table 3. Patient outcomes with respect to type of toxic substance

Toxic Substance	Number of patients	Hospitalized	Transferred	Discharged	Death
Drugs	204	7 (3.7%)	55 (27.0%)	72 (35.3%)	-
Pesticides	46	22 (47.8%)	10 (21.7%)	14 (30.4%)	1 (2.2%)
Toxic Gases	43	9 (20.9%)	4 (9.3%)	30 (69.8%)	2 (4.7%)
Corrosives	28	9 (32.1%)	9 (32.1%)	10 (35.7%)	1 (3.6%)
Alcohol	15	2 (13.3%)	4 (26.7%)	9 (60.0%)	-
Food	68	7 (10.3%)	5 (7.4%)	56 (82.3%)	1 (1.5%)
Animal origin	13	1 (7.7%)	3 (23.1%)	9 (69.2%)	-
Others	13	1 (7.7%)	6 (46.1%)	6 (46.1%)	-
Total	430	128 (29.8%)	96 (22.3%)	206 (47.9%)	5 (1.2%)

Statistically significant differences were observed as poisoning with drugs was more common among women while poisoning with alcohol was more common among men ($p < 0.05$). There was no other gender difference among the other poisoning categories. Mean age and median age were lo-

wer among patients poisoned with drugs and alcohol ($p < 0.05$).

The highest hospitalization rate was seen in poisoning with pesticides. No patients died in the ED; however, 5 patients died during their follow up at hospital. Ninety-nine patients were hospitalized in the reanimation intensive care unit (ICU), and 11 in the psychiatry, 8 in the gastroenterology, 4 in the nephrology, 3 in the infectious diseases, 2 in the pulmonary medicine, and 1 in the general surgery clinics. No statistically significant difference was detected in mortality among different toxic substances.

Eighty-two patients (19.1%) had some degree of altered consciousness according to the Glasgow Coma Score (GCS). The GCS was ≤ 8 in 21 patients and between 9 and 14 in 61 patients. The remaining 348 patients were fully awake (GCS = 15).

The most common type of acute poisoning was with drugs (47.4%); 125 (61.3%) of the patients had taken one drug and 79 (39.7%) had taken multiple drugs. Antidotes (N-acetyl cysteine and flumazenil) were given to 16 (7.9%) of the patients. Six (2.9%) patients required mechanical ventilation. There was no mortality among the patients poisoned with drugs. The toxic drug taken could not be ascertained in 23 (11.2%) of the patients. Commonly taken drug groups were antidepressants ($n=55$, 30.3%), analgesics ($n=43$, 23.7%), sedatives ($n=21$, 11.6%), cardiovascular drugs ($n=15$, 8.2%), antiepileptics ($n=13$, 7.1%), antibiotics ($n=12$, 6.6%), and antipsychotics ($n=12$, 6.6%). Moreover, 201 (98.5%) of the patients had taken drugs with suicidal intentions, and of these 147 (73.1%) women and 54 (26.9%) were men and the women to men ratio was^{2,7}.

Forty-six patients were admitted with poisonings due to pesticides. Twenty-seven (58.7%) of these patients were poisoned with organophosphates (oral ingestion in 23 and inhalation in 4 patients). Twenty-four (52.2%) of the patients had taken pesticides with suicidal intention and 13 of them were women. Eighteen patients with organophosphate poisoning were administered antidotes (atropine and pralidoxim). Seven (15.2%) patients required mechanical ventilation and 1 patient died in the ICU.

Forty-three patients were admitted due to poisoning with toxic gases. Forty-two of these patients (9.8% of all acute poisonings) suffered CO intoxication and 1 patient attempted suicide by LPG intoxication. Five (11.6%) of the CO intoxicated patients required mechanical ventilation and 2 of them died in the ICU.

Twenty-eight patients were admitted due to corrosive substance ingestion. Seven (25%) of them had ingested corrosives with suicidal intention. Four of them were women and 3 were men. One patient required mechanical ventilation, and subsequently died during the clinical course in the general surgery ICU.

Fifteen patients were admitted due to excessive alcohol intake. Two of the patients had ingested methyl alcohol and remaining 13 patients had drunk ethyl alcohol. Three patients

had consumed alcohol with the intention of suicide. Two patients with methyl alcohol intoxication were hospitalized and 1 of them required hemodialysis. There was no mortality among the alcohol intoxication patients.

Sixty-eight (15.8%) patients were diagnosed with food poisoning. Nineteen of them had been poisoned with mushrooms. Seven of the food poisoning patients, 6 of which were mushroom poisonings, were hospitalized. One patient with mushroom poisoning died in the gastroenterology clinic.

Thirteen patients were admitted due to animal origin poisonings (4 snake bites, 4 scorpion stings, and 5 insect bites). One of the patients who suffered a snake bite was hospitalized and none died.

Ten patients were admitted due to volatile substance inhalation (2 thinner, 1 glue (Bally), 2 dye, 2 ammonia water, and 3 bleach). One patient was admitted with herbal intoxication and 2 patients' source of intoxication was unidentified. One of the 13 patients who were categorized as others was hospitalized and none died.

Two hundred thirty-six (54.9%) patients had taken toxic substances with the purpose of suicide. Of these, 201 (85.2%) had taken drugs, 24 (10.2%) pesticides, 7 (3.0%) corrosives, and 3 (1.3%) alcohol, and 1 (0.4%) had inhaled LPG. Moreover, 163 (69.1%) of the patients were women and the women to men ratio was 2.2. The mean age of these patients was 26.3 ± 10.6 , median age was 23, and range was 15-81. Prior psychiatric disorders were diagnosed in 36 (15.2%) of these patients and 4 (1.7%) had attempted suicide previously. One hundred (42.4%) of the patients who had attempted suicide were hospitalized, 62 (26.3%) were transferred to other hospitals, and the remaining 74 (31.4%) were discharged from the ED after an initial evaluation and treatment.

DISCUSSION

Acute poisonings are seen in an important group of ED patients and pleasingly many studies aiming to determine morbidity and mortality trends of poisonings in Turkey have been published recently. Table 4 summarizes ED studies on acute poisonings from different cities in this country⁹⁻²².

The percentage of adult acute poisonings in all ED admissions is reported to be 0.5% to 2.4% in this country and 0.18% to 2.1% in other countries^{4,9-25}. In our study this rate was 1.96% and it was higher than the previous literature values. This may be explained by the location of our hospital in the area; it is the only tertiary care center with a poison control center in the South Marmara region, which makes it a referral center for acute poisonings. In fact, an important proportion of the patients included in our study (38.8%) had been transferred to our hospital after initial management.

Acute poisonings were more common in women (55.9%-78%) and the most common cause of poisonings was drugs in all studies from this country^{9,22}. Studies from Oman, Sri Lanka, India, and South Africa reported a higher prevalence among men (52%-71.8%) and the most common cause of po-

isoning was alcohol in Finland and Spain, pesticides in Sri Lanka and India, and traditional remedies in South Africa²³⁻²⁴⁻²⁶⁻²⁹. This may be related to differences in the cultural, socioeconomic, and geographic features of the countries. In western countries, the rate of intentional self-poisoning with alcohol and illicit drugs is relatively high compared to that in underdeveloped countries.

Table 4. Epidemiologic studies on adult acute poisonings from Turkey

Region	City	Date (period)	Number of patients	ED admissions (%)	Women / men ratio	Mean age (women / men)	poisonings with rugs (%)	suicides (%)
North west	İstanbul ⁹	2001 (1 year)	284	2.4%	73/27	27	69.3%	72%
	Bursa ¹⁰	1996-2001 (5 years)	1818	1.57%	63/37	27/31	59.6%	?
	Bursa (Our study)	2002-2003 (1 year)	430	1.96%	60.2/39.8	28/32.7	47.4%	54.9%
West	Aydın ¹¹	2000-2003 (4 years)	156	0.5%	60.2/39.8	27.3/31.5	32.7%	34.6%
	Manisa ^{12x}	1999-2004 (5 years)	341	?	62.8/37.2	10-20	59.8%	74.5%
	İzmir ^{13x}	1989-1990 (2 years)	252	0.84%	57.5/42.5	17+	41.5%	55.4% ^y
South	Adana ¹⁴	1997-2002 (6 years)	2229	1.6%	67.5/32.5	23.8/29.3	59%	76%
	Adana ¹⁵	2004 (1 year)	491	2.4%	67.6/32.4	24.4/27.1	71%	87%
	Mersin ^{16x}	2002-2004 (2 years)	195	0.97%	55.9/44.1	17-25	55.4%	50.3%
Central	Ankara ¹⁷	1997-1998 (1 year)	228	0.7%	75/25	24.6/27.3	75.8%	78.9%
	Ankara ¹⁸	1998-2002 (50 months)	1098	0.81%	78/22	26	?	97%
	Sivas ¹⁹	2004-2005 (1 year)	220	?	69/31	16-24	55%	?
East	Elazığ ²⁰	2000-2001 (1 year)	262	2%	72.2/27.8	27.3/32.7	?	?
South east	Gaziantep ²¹	2000-2001 (2 years)	179	0.7%	64.8/35.2	27.5	62.5%	58.6%
	Diyarbakır ²¹	2000 (1 years)	170	?	74.1/25.9	23.3	60.6%	63.5%

x:Study was conducted in all age groups. y:Adult data extracted from the study

Studies from Turkey reported the common types of drugs ingested to be psychoactive drugs (17.5%-52%) (antidepressants: 6%-51.6%, sedatives: 5.3%-11.6%, antipsychotics: 2%-14.6%), analgesics (15.3%-47.9%) (paracetamol: 9.2%-32.2%), cardiovascular drugs (4%-10.7%), antiepileptics (1.8%-7.7%), and antibiotics (1.8%-16%)⁹⁻²². In our study the most common types of drugs were psychoactive drugs (48.5%) and analgesics (23.7%).

There are differences among different regions of Turkey in terms of frequency of exposure to toxic substances other than drugs. Studies from metropolitan cities such as Ankara and İstanbul reported poisoning with pesticides to be as low as 0.5%-1.06%, while in studies from rural areas such as Adana, Mersin, and Diyarbakır, where farming and insecticide use are very common, poisoning with pesticides was reported to be as high as 16.5%-34.7%^{9,14-18,22}. Similarly, CO intoxication was reported to be more frequent (6.9%-17.6%) in cities such as An-

kara, İstanbul, Bursa, Sivas, and Gaziantep, where winters are relatively cold and stove use is high; on the other hand, studies from cities with warmer climates, such as Adana and Mersin, reported CO poisoning rates of 1%-1.8%^{9,10,14,17,19,21}. Likewise, worldwide studies from warm climate countries such as Oman, Sri Lanka, India, and South Africa have not mentioned CO poisonings^{23,26-28}.

The hospitalization rate for acute poisonings was reported to be between 30.8% and 98.3%^{9,11-22}. In our study and a previous study from our ED, an admission rate of 29.8% and 21.5%, respectively, was reported¹⁰. The transfer rate of patients to another hospital was the highest in our study (22.3%). The reason for this difference may be related to hospitals' ED policies. Most acute poisoning cases require hospital observation for 24-48 h. Our ED policy does not permit patients to be observed for more than 24 h. As the reanimation ICU has a limited capacity and our hospital does not have a general medi-

cine ward that could accept these patients our transfer rate was high. An organizational change in our hospital may decrease the transfer load of these patients.

Poison control center data from the United States showed that, of every 147 patients exposed to poison, 59 (40.1%) were admitted to the ED, 13 (8.8% of total 22% of ED admissions) were hospitalized, and 1 (0.6% of total and 1.7% of ED admissions) died³⁰. Mortality rates between 0% and 3.9% have been reported from Turkey and in our study the mortality rate was 1.2%⁹⁻²².

The rate of suicide attempts among all acute poisonings was reported to be between 54.4% and 97% in this country, with the exception of a study from Aydın, which reported this rate as 34.6% with a high rate of animal origin poisonings (26.3%)^{9-11,13-15,17,18,21,22}. This rate was reported as 42% and 77.7% in studies from Oman and Spain, respectively^{24,26}. Our rate was 54.9%.

Comparison of our results with previous 5-year study from our ED revealed that percentage of poisoning with drugs had decreased from 59.6% to 47.4%¹⁰. The percentage of pesticide poisonings increased from 3.2% to 10.7% and the percentage of other poisonings decreased from 9.8% to 3%. These changes may be the result of the inclusion of rodenticide poisonings in "the others" group in the previous study and in "the pesticides" group in our study. Our results not only suggest a tendency toward a lower rate of drug poisonings but also an increase in ingestion of antidepressants for suicidal purpose (from 18.7% to 30.3%). The reason for this increase in antidepressant poisonings may be the recent rise in the use of antidepressants and ease of access to antidepressants, since they can be bought without prescription.

There may be some limitations in comparing the results of epidemiological studies. In Turkey there is no consensus on the classification of toxic substances for studies on acute poisonings. The main controversies in classification involve the inclusion of rodenticides in either "the pesticides" or "the other poisonings" group, animal origin poisonings are not included in some studies and are included in "the other poisonings" in some, food poisonings other than mushroom are not included in some studies, and finally some studies did not report the results of children and adult patients separately^{9,22}. Furthermore, it is not sufficient just to compare the results as rates and ratios. Comparisons with respect to poisoning rates per population and regions and studies may be more useful.

In conclusion, our results are similar to those of previous studies from this country in terms of rate of acute poisonings on general ED patient load, as poisonings are more common in women and younger ages, drugs are the most common type of poisonings, suicidal poisonings are common, and mortality is low. A tendency toward a lower rate of drug poisonings and an increase in ingestion of antidepressants with suicidal purpose was observed in our unit when compared to a previous study. The most important difference from other studies from this country was our high transfer rate. This is a result of our hospital's ED policy. Our suggestion is standardizati-

on of data forms in all EDs countrywide and collection, analysis, and publication of these data by the Ministry of Health and Poison Control Centers, which may improve the management quality of poisonings and may help in the development of a national poisoning policy.

Correspondence Address: Celaeddin DEMİRCAN
Uludag University Medical
Faculty, Department of Internal
Medicine Unit, Bursa, Turkey
Phone: 0224 295 10 15
E-mail: demircan@uludag.edu.tr

REFERENCES:

1. Wax PM. Historical principles and perspectives. In: Goldfrank LR, Flomenbaum NE, Lewin NA, Howland MA, Hoffman RS, Nelson LS, editors. Goldfrank's Toxicologic Emergencies. 7th ed. New York: McGraw-Hill; 2002, P:1-17.
2. Kotwica M, Czerczak S. Acute poisoning registered since 1970: trends and characteristics. Analysis of the files collected in the National Poison Information Centre, Lodz, Poland. Int J Occup Med Environ Health 2007; 20: 38-43.
3. Staikowsky F, Theil F, Mercadier P, Candella S, Benais JP. Change in profile of acute self drug-poisonings over a 10-year period. Hum Exp Toxicol 2004; 23: 507-11.
4. MacNamara AF, Riyat MS, Quinton DN. The changing profile of poisoning and its management. J R Soc Med 1996; 89: 608-10.
5. Meredith TJ. Epidemiology of poisoning. Pharmacol Ther 1993; 59: 251-9.
6. Konradsen F, van der Hoek W, Cole DC, Hutchinson G, Daisley H, Singh S, Eddleston M. Reducing acute poisoning in developing countries - options for restricting the availability of pesticides. Toxicology 2003; 192: 249-61.
7. Turvill JL, Burroughs AK, Moore KP. Change in occurrence of paracetamol overdose in UK after introduction of blister packs. Lancet 2000; 355: 2048-9.
8. Devlet İstatistik Enstitüsü 2000 Yılı Nüfus Sayımı Verileri. Bursa İli Nüfusunun Sosyal ve Ekonomik Özellikleri. Ankara; DİE Matbaası: 2002.
9. Tüfekçi IB, Çurğunlu A, Şirin F. Characteristics of acute adult poisoning cases admitted to a university hospital in İstanbul. Hum Exp Toxicol 2004; 23: 347-51.
10. Akkose S, Bulut M, Armagan E, Cebicci H, Fedakar R. Acute poisoning in adults in the years 1996-2001 treated in the Uludag University Hospital, Marmara Region, Turkey. Clin Toxicol (Phila) 2005; 43: 105-9.
11. Kurt İ, Erpek AG, Kurt MN, Gürel A. Adnan Menderes Üniversitesi

- tesinde izlenen zehirlenme olguları. AMÜ Tıp Fakültesi Derg 2004; 5: 37-40.
12. Ok G, Erbüyün K, Mirzai İT, Vatansever D, Tok D. Acil servise başvuran zehirlenme olgularının retrospektif olarak incelenmesi. Toksikoloji Derg 2006; 4: 5-9.
 13. Pinar A, Fowler J, Bond GR. Acute poisoning in Izmir, Turkey - a pilot epidemiologic study. Clin Toxicol 1993; 31: 593-601.
 14. Seydaoglu 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: 393-401.
 15. Akbaba M, Nazlıcan E, Demirhindi H, Sütuluk Z, Gökel Y. Etiological and demographical characteristics of acute adult poisoning in Adana, Turkey. Hum Exp Toxicol 2007; 26: 401-6.
 16. Mert E, Bilgin NG. Demographical, aetiological and clinical characteristics of poisonings in Mersin, Turkey. Hum Exp Toxicol 2006; 25: 217-23.
 17. Ozkose Z, Ayoglu F. Etiological and demographical characteristics of acute adult poisoning in Ankara, Turkey. Hum Exp Toxicol 1999; 18: 614-8.
 18. Akkas M, Coskun F, Ulu N, Sivri B. An epidemiological evaluation of 1098 acute poisoning cases from Turkey. Vet Human Toxicol 2004; 46: 213-5.
 19. Yılmaz A, Güven FMK, Korkmaz İ, Karabulut S. Acil serviste akut zehirlenmelerin retrospektif analizi. CÜ Tıp Fakültesi Derg 2006; 28: 21-6.
 20. Pekdemir M, Kavalcı C, Durukan P, Yıldız M. Acil servisimize başvuran zehirlenme olgularının değerlendirilmesi. Acil Tıp Derg 2002; 2: 36-9.
 21. Goksu S, Yildirim C, Kocoglu H, Tutak A, Oner U. Characteristics of acute adult poisoning in Gaziantep, Turkey. J Toxicol Clin Toxicol 2002; 40: 833-7.
 22. Güloğlu C, Kara İH. Acute poisoning cases admitted to a university hospital emergency department in Diyarbakır, Turkey. Hum Exp Toxicol 2005; 24: 49-54.
 23. Thomas M, Anandan S, Kuruvilla PJ, Singh PR, David S. Profile of hospital admissions following acute poisoning-experiences from a major teaching hospital in South India. Advers Drug Toxicol Rev 2000; 19: 313-7.
 24. Burillo-Putze G, Munne P, Duenas A, Pinillos Ma, Naveiro JM, Cobo J, Alonso J. National multicentre study of acute intoxication in emergency departments of Spain. Eur J Emerg Med 2003; 10: 101-4.
 25. McCaig LF, Burt CW. Poisoning-related visits to emergency departments in the United States, 1993-1996. Clin Toxicol 1999; 37: 817-26.
 26. 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.
 27. Van Der Hoek W, Konradsen F. Analysis of 8000 hospital admissions for acute poisoning in a rural area of Sri Lanka. Clin Toxicol 2006; 44: 225-31.
 28. Joubert PH. Poisoning admissions of Black South Africans. Clin Toxicol 1990; 28: 85-94.
 29. Lapatto-Reiniluoto O, Kivisto KT, Pohjola-Sintonen S, Luomanmaki K, Neuvonen PJ. A prospective study of acute poisonings in Finnish hospital patients. Hum Exp Toxicol 1998; 17: 307-311.
 30. Litovitz TL, Felberg L, White S, Klein-Schwartz W. 1995 Annual report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. Am J Emerg Med 1996; 14: 487-537.