Original Article

Characteristics of acute adult poisonings in a university hospital emergency department in central Turkey: a three-year analysis

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Abstract

Objective: To evaluate the etiologic and demographic characteristics of acute adult poisoning cases and to obtain up-to-date information on acute poisonings.

Methods: A retrospective study was conducted to evaluate 1254 adults who presented with acute poisoning to the Emergency Department of our tertiary care university hospital in central Turkey from January 2007 to December 2009. The data extracted from each chart related to age, gender, marital status, agent involved in the poisoning, season of event, route of poisoning, time between ingestion or exposure and arrival at the casualty ward, mechanism of toxic exposure (unintentional or intentional), level of consciousness, length of stay in the ward, and outcome.

Results: Acute poisonings comprised 1.40% of Emergency Department patients; 65% were female, while 47% were between the ages of 16 and 25 years. Medicinal drugs were the most common cause of poisonings (68%), followed by gases (9.5%). Antidepressants were the most frequent drug ingested (18%), followed by analgesics (16%). Intentional poisonings constituted the majority of cases (78%). Most suicide attempts were made by women (68%) and majority of the patients were married (57%). Twenty patients (1.6%) died during their hospital stay, with organophosphate pesticides being the most common agent (n=8) involved in fatal poisonings.

Conclusion: Pharmaceutical agents, carbon monoxide and pesticides are the three most common poisoning agents. Deliberate self-poisoning is common in adults in the area of the study; the risk being highest in females and younger adults. These up-to-date data provide important information on the characteristics of acute poisonings and can guide activities such as professional training, preventive measures, community education and new research.

Keywords: Acute poisoning, Suicide, Drug (JPMA 62: 129; 2012).

Introduction

Toxic exposures to drugs and chemicals are among the most frequent reasons for Emergency Department (ED) visits in most countries[1-3] and a significant cause of morbidity and mortality worldwide.[4] Poisoning is a heterogeneous subject that involves various pharmaceutical and chemical compounds in different combinations, and poses a challenge for even the most experienced of clinicians.[4] However, the causes and patterns of poisonings vary in different countries.[3,5] Advances in technology and social development have resulted in the availability of most drugs and chemical substances in the community.[5] In addition, patterns of both therapeutic and illicit drug use in any one area may change over time.[6,7] For these reasons, keeping information about acute poisonings updated is essential for the efficient use of resources in the prevention and management of acute poisonings, and for carrying out effective training programmes and new research.

We, therefore, conducted a retrospective study to describe the etiologic and demographic characteristics of adult patients presenting with acute poisoning to our university medical center ED over a three-year period.

Patients and Methods

Medical records of adult patients presenting with acute poisoning to the ED between January 1, 2007 and December 31, 2009 were reviewed retrospectively. Data were extracted from charts coded as T36-T50 (poisoning by drugs, medicaments, and biological substances), T51-T65 (toxic effects of substances chiefly non-medicinal as to the source), and X60-X84 (intentional self-harm) with the ICD 10 system of nomenclature. The following data were extracted from each chart: age, gender, marital status, agent involved in the poisoning, season of event (spring: March-May; summer: June-August; autumn: September-November; winter: December-February), route of poisoning, time between

ingestion or exposure and arrival at the ED, mechanism of toxic exposure (unintentional or intentional), level of consciousness, length of stay in the ED, and outcome (discharge, hospitalisation or death).

The hospital is located in Kayseri, an industrial city in the central Anatolian region of Turkey which is surrounded by rural farmlands. The hospital has 1300 beds and is the main referral hospital for a population of about two million from Kayseri and its neighbouring provinces.

Poisons involved in the exposure were classsified into one of seven categories: pharmaceuticals, gases, pesticides, corrosives, foods, alcohols, others (including rodenticides, hydrocarbons, plants, solvents, etc). Pharmaceuticals were subcategorised into antidepressants, analgesics, other psychotropic agents (including antipsychotics, benzodiazepins, lithium, etc.), antiepileptics, antibiotics, antihypertensives, antihistamines, antispasmodics, anti-ulcer drugs, others (including vitamins, antiemetics, antidyspeptic drugs, antidiabetics, hormones, skeletal muscle relaxants, warfarin, drugs for the common cold, etc.), and unidentifiable pharmaceuticals. The number of ingested pharmaceuticals was also recorded.

Quantitative variables were summarised as mean±standard deviation. Frequency and percent distribution were used for the evaluation of data and the chi-squared test was used for comparison of the qualitative variables. Statistical analyses were calculated using SPSS version 15.0 (SPSS Inc., Chicago, USA). Two-tailed P values less than 0.05 were considered to be statistically significant.

The study was approved by the Ethics Committee of Erciyes University Medical School.

Results

Of the 98909 adult patients presenting to the ED during the 3-year period, 1364 (1.4%) were cases related to poisoning. For technical reasons, data was unavailable for 110 patients (insufficient data in 49 charts, lost charts in 61 cases), and they were excluded from the study. The mean age of the remaining 1254 poisoned patients was 31±14 years. Of them, 65% were female. The mean age of female and male patients was 30±13 years and 34±15 years respectively. In terms of age groups, most of our patients (47%) were under 26 years of age (Table-1). Seasonal variation of the patients was as follows: spring (21.1%, 265 cases), summer (30.1%, 378 cases), autumn (22.6%, 283 cases) and winter (26.2%, 328 cases).

Table-1: Demographic characteristics of the patients.

Demographic characteristics	n	%
Gender		
Female	810	35.4
Male	444	64.6
Age groups (years)		
16-25	593	47.3
26-34	316	25.2
35-43	159	12.7
44-54	89	7.1
55-64	50	4.0
≥ 65	47	3.7
Marital status		
Married	742	59.2
Single	481	38.4
Divorced/widowed	31	2.5

Table-2: Pharmaceutical agents (one or multiple) involved in the poisonings.

Pharmaceuticals	n	%
Single agent poisonings	629	74.0
Antidepressants	157	18.5
Analgesics	138	16.2
Other psychotropic	45	5.3
Antiepileptics	43	5.1
Antibiotics	19	2.3
Antihypertensives	18	2.1
Antihistamines	14	1.6
Antispasmodics	7	0.8
Anti-ulcer	6	0.7
Others	67	7.9
Unidentifiable	115	13.5
Number of pharmaceuticals, if more than one involved	214	26.0
Two	167	20.0
Three	22	3.0
Four	15	1.8
Unidentifiable	11	1.2

The distribution of poisoning agents were as follows: pharmaceuticals (68%, 854 cases), gases (9.5%, 119 cases), pesticides (9.3%, 117 cases), corrosives (4.0%, 51 cases), food (3.7%, 47 cases), alcohol (2.4%, 30 cases), others (3.0%, 38 cases). Within the category of pharmaceuticals, antidepressants were involved most often, followed by analgesics (Table-2). Of those ingesting antidepressants, tricyclic antidepressants (TCAs) were used in 57% cases, and selective serotonin reuptake inhibitors (SSRIs) in 31%. Of those ingesting analgesics, paracetamol was used in 39% and nonstereoidal anti-inflammatory drugs (NSAIDs) in 27%. A combination of drugs were used in 26% cases, the most common combinations being analgesics plus antibiotics (17%) and analgesics plus antidepressants (12%).

Carbon monoxide (CO) was the most common (80%) gas involved, usually as a result of unintentional exposure (83.2%). The pesticides involved were almost all organophosphates (93%). Sodium hypochlorite (bleach) constituted the majority of corrosive ingestions (71%). Among food-related poisonings, mushrooms were most commonly (56%) involved; the remaining food intoxications were due to herbs (16%), household meals (6%), canned

Table-3: Intention and type of agents involved in the poisonings.

Agents	Unintentional		Intentional		Total	
	n	%*	n	%*	n	%**
Pharmaceuticals	55	6.4	799	93.6	854	68.1
Nonmedicinal substances	216	54.0	184	46.0	400	31.9
Total	271	21.6	983	78.4	1254	100.0

* Row percent **Column percent chi squared = 375.93, p<0.001.

foods (6%) and unidentifiables (16%). Of patients with alcohol intoxication, ethanol was used in 87%, methanol in 10%, and ethylene glycol in 3%. Twelve patients ingested ethanol together with pharmaceuticals.

The route of poisoning was oral ingestion in 89%, inhalation in 10%, transdermal in 0.4%, and mixed in 0.9% (including inhalation plus transdermal or oral ingestion).

Intentional self-poisoning cases constituted the majority of the patients (Table-3). Most of the pharmaceutical-related poisonings were due to suicidal attempts while majority of the non-pharmaceutical poisonings were accidental in nature (93.6% and 54.0%, respectively, p<0.001). Of those in whom a suicide attempt was made, 668 (68%) were female. The proportion of suicide attempts was significantly higher in female than male patients (82.5% and 70.0% respectively; p<0.001. Most of the patients attempting suicide were younger than 26 years of age (507 cases, 52%, p<0.001). The majority of intentional poisonings occurred in patients who were married (557 cases, 57%, p<0.01).

The clinical status of the patients on arrival was good in general, 70% being fully awake (Glasgow Coma Scale (GCS) =15), while 126 (9%) patients were unconscious (GCS 8), and 263 (21%) were in between these two levels of consciousness (GCS = 9-14).

The large majority (80%) of the patients were from the province of Kayseri, while the remaining patients came from surrounding provinces. For 54% of the patients, the mean time from exposure to arrival at the ED was 3 hours (<1 hour in 41%, 1-3 hours in 13%). Most patients (78%) were evaluated and then treated and discharged from the ED, while 22% were admitted to the hospital. Twenty (1.6%) patients died during their hospitilisation (mean 4.5 days after arrival, range 1-138 days). Two patients died while in the ED - one after an unintentional exposure to CO and one due to an intentional ingestion of organophosphate insecticide. An additional patient was dead on arrival, after taking multiple pharmaceuticals with suicidal intention. Twenty patients died while hospitalised; the agents involved were organophosphates in 8 (39%), pharmaceuticals in 5 (22%), CO in 2 (11%), foods (herb, mushroom) in 2 (11%), methanol in 2 (11%), and cannabis in 1 (6%). The overall mortality rate in the poisoned patients was 1.6%.

Length of stay in the ED was as follows: 0-6 hours in 35 cases (3%), 7-12 hours in 54 cases (4%), 13-24 hours in 161 cases (16%), 25-48 hours in 845 cases (67%), 49-72 hours in 139 cases (11%), and >72 hours in 20 cases (2%). Patients received a variety of initial therapies in the ED such as gastric lavage, oral activated charcoal, oxygen, specific antidotes, endotracheal intubation, mechanical ventilation, etc. For critical TCA ingestions, sodium bicarbonate was given; for paracetamol ingestions, oral or intravenous N-acetylcysteine; for CO inhalation, 100% normobaric oxygen; for organophosphates, pralidoxime and atropine.

Discussion

Our ED had a proportion of acute poisoning cases (1.4%), similar to that (0.7-2.4%) reported from EDs in other parts of Turkey.[8-12] In a study of adult poisoning cases in Canada, acute intoxications accounted for 0.7% of ED visits.[6] In a prospective study conducted in Oman, Hanssens et al. reported that acute poisoning cases were 0.18% of total emergency admissions.[13] Another study on poisonings performed in England revealed that 1.2% of ED visits were due to acute poisoning.[14]

As in other reports, the majority of our patients were young; 47% were under 26 years of age, similar to proportions in two international studies and in one study from Turkey.[6-8] However, in the study of Reiniluto et al.[3] from Finland, the highest number of poisonings occurred in the 28-37 year-old age group in males and in the 38-47 year-old age group in females.3 The female:male ratio in our patients was almost 2:1. In previous reports from Turkey, the female:male ratio varied between 1.7 and 3.0.[8,9,11] In a study from Tabriz, Iran, this ratio was 1.2.5 Interestingly, this ratio has been reported to be lower (approximately 1:1) in various developed countries.[6,15,16]

In our study, the number of suicidal poisonings were higher than those of accidental poisonings, and attempted suicide was more common among females than males. These findings are consistent with data of previous Turkish[12,17] and international reports.[5,18-20]

The substances involved in most of the poisonings in our study were pharmaceutical agents (68%), which is in

agreement with reports from other regions in Turkey.[9,11,12] In studies from other countries, pharmaceuticals were also found to be the most common agents involved in acute poisoning.[5,15,20] Regarding the class of pharmaceutical involved in poisonings in Turkey, analgesics were reported to be the most frequently ingested agents in some studies (16% in our study),[8-10] whereas antidepressants were most commonly used in the study by Baydin et al,[11] as was the case in our study (18.5%). Benzodiazepines were the most commonly ingested agents among medicinal drug poisonings in Finland, Iran, Canada and Norway.[3,5-7] While a prescription is needed to purchase benzodiazepines in Turkey, in practice, TCAs and SSRIs are easily available without a prescription. In Turkey, TCAs are considerably cheaper than other antidepressants and are known to be used for insomnia and as 'stress reducers' among the general public. On the other hand, SSRIs are considered to be 'drugs for well-being' among non-medical people. These factors may explain why antidepressants are so common in intentional poisonings in Turkey. Misinformation about these drugs reveals the necessity for widespread community education. As in our study, paracetamol was the most common analgesic agent involved in two regional poisoning studies from Turkey.[8,12] However, in studies from other regions, NSAIDs were the most ingested analgesics.[9,17] Paracetamol was also found to be most common analgesic in poisonings in studies from England.[14,15] The high incidence of analgesic poisonings may be due to the availability of these drugs without prescription in most countries. Besides, analgesic agents may be found preferable by those attempting suicide because they are generally known to have low fatality index.

In about one-fourth of our cases involving pharmaceutical agents, more than one drug was ingested; the most common combinations being analgesics plus antibiotics, and analgesics plus antidepressants. Studies from other areas in Turkey report a similar rate of polydrug ingestion in poisoned patients.[9,12]

The second most common type of poisoning in our study was gas inhalation, occurring in 9.5% of cases; 80% of them being CO intoxications. CO poisoning is still a serious problem in Turkey, especially during autumn and winter. Although natural gas and modern furnaces are now used in homes in many cities in Turkey, including Kayseri, traditional coal stoves are also used widely. CO poisoning occurs due to dysfunctioning coal stoves, inadequate maintenance of chimney systems, or deliberate closure of the flue at night to prevent cold air from entering the home. Thus, whole families may present to the ED when strong winds prevent the exhaust of normal smoke from the coal stoves. The percentage of ED admissions due to CO poisoning in previous Turkish reports varied between 7 and 14%.[10,13,15,19] CO poisoning resulting from various mechanisms or processes is still an important problem in other parts of the world.[4,21]

Pesticides were the third most common toxic agent (9.3%), over 90% of whom were poisoned with organophosphates. These caused 40% of the deaths in our study. Similarly, in a comprehensive review of 76 articles published between 1980 and 1999, Eddlestone reported that organophosphate pesticides were responsible for the majority of deaths in most series of self-poisoning cases, particularly those from rural areas.[22] Kayseri and its neighbouring cities are surrounded by large agricultural areas. As such, pesticides are often sold in local markets and kept in homes.[23,24] Studies from non-agricultural areas in Turkey, such as Ankara and Istanbul, reported the percentage of poisonings involving pesticides to be much lower, 0.9% and 1.6% respectively[9,12] while those from agricultural areas reported involvement of pesticides in 12-26 % of cases.[11,17]

Corrosive agents were ingested by 4% of our patients, most of these (71%) being sodium hypochlorite (bleach) poisonings. Bleach is cheap, widely used and may be ingested accidentally or intentionally. The incidence of corrosive ingestion was reported to be 2.2 % in a Turkish study[11] and 2% in a European study.[2]

Deaths due to foodstuff occurred in two of our patients (0.2% of all cases, 4% of all foodstuff-related poisonings), one due to mushroom (3.8% of our mushroom ingestion cases) and one due to herbal poisons (14% of our herb poisoning cases). Baydin et al reported that mushroom-related deaths occurred in 0.9% of mushroom poisoning cases.[11] Thirty patients (2.4%) presented to our ED due to alcohol intake. Of these, three patients ingested methanol, two of whom died due to massive ingestion. Methanol is obtained in Turkey through the illegal production and sale of bootleg "eau de cologne"[17] and alcoholic beverages; these are the most common causes of severe methanol poisonings and deaths in Turkey. Other studies of poisoning in Turkey report lower and higher incidences of alcohol intoxication compared to our study.[9,10,17]

About half of our patients reached the ED within 3 hours of ingestion or exposure (0-1 hour in 41%, 1-3 hours in 13%). This rapid transport may be explained due to the fact that the exposure of 80% of the patients was in Kayseri, the same province in which the hospital is situated. The large majority (78%) of patients were discharged from the ED after their treatment and observation. This is probably due to the fact that the clinical status of the patients on arrival was good in general (70% had a GCS of 15). Another reason for the low rate of admission is that our hospital and its ICUs were frequently full, thus the patient remained in the ED for a prolonged period (24-48 hours in 67% of cases) and were then discharged from the ED. In fact, we routinely kept patients for at least 24 hours unless they gave a reliable

history and were mild cases clinically.

The overall mortality rate was 1.6% in our patients; previous studies reported mortality rates from 0-2.8 %.[8,9,11] Eddlestone reported that mortality rates due to poisonings may range from 0 to 50%.[22] The reported fatality rates due to poisonings may vary depending on factors such as severity of intoxications, ingestion of lethal or nonlethal agents, and death of serious cases before being brought to the hospital.[9,12,22,24] Although one death was due to cannabis in our study, illicit drug use is extremely rare in our region.

The study had some limitations. The retrospective design of our study meant that completeness of data could not be verified prospectively; thus 110 cases had to be excluded from the study. Being a single-centre study, extrapolation of our findings to EDs in other regions of Turkey and abroad may not be appropriate. This hospital-based study may not be representative of poisonings in the general population.

Conclusion

Pharmaceutical agents, CO, and pesticides were the three most common poisoning agents encountered in our ED during the study period. Deliberate self-poisoning is common in adults in our area; the risk being highest in females and younger adults. The data provide important information on characteristics of acute poisoning in this particular region of Turkey and may guide activities such as professional training, preventive measures, community education and new research.

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