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Review Article

Pattern of acute poisonings in Azerbaijan

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Background: Epidemiologic data on acute chemical poisonings in Azerbaijan Republic is very limited. The purpose of this study was to evaluate and analyze the rate and characteristics of acute chemical poisoning cases in Azerbaijan.

Material and methods: This investigation was performed on the data of poisoned patients admitted to the Center of Clinical Toxicology (CCT) of the Ministry of Health of Azerbaijan in Baku city from 1st January 2014 to 31st December 2016.

Result: There were 6347 admissions due to acute poisoning in CCT intensive care unit (3593 females and 2754 males). Pediatric admissions (<15 age group) were 18.2%. The most frequent reason of hospitalizations was drug poisonings (T36-T50) – 40.9%. The other frequent cases of hospitalizations were inhalation of carbon monoxide (T58) - 21.6%, corrosive substances (T54) – 15.2% and alcohol intoxication (T51) - 5.9%. Hospitalizations of patients with envenomation (T63) - 5.2%, pesticides poisonings (T60) – 4.9%. poisoning by organic solvents (T52) - 4.5% and poisoning by noxious plants and mushrooms (T62) – 1.2% were less frequent. The mortality rate of the overall cohort was 2.7%. Corrosive liquids (especially – concentrated acetic acid) poisonings were the most often fatal.

Conclusion: This study provides essential information about characteristic of toxicoepidemiological situation in Azerbaijan and could help to develop national program of prevention of acute chemical poisonings.

Keywords: acute poisoning, epidemiology, Azerbaijan

Introduction. Poisoning is a significant global public health problem. According to WHO released data, in 2004 approximately 346,000 people died worldwide from unintentional poisoning. Of these deaths, 91% occurred in low- and middle-income countries [1]. The collection of epidemiological data on acute intoxications improves our knowledge of human poisoning [2]. Epidemiological studies conducted in Azerbaijan's neighboring countries showed significant difference in the structure of acute poisoning [3;4;5]. In addition, the toxicoepidemiological profile may be different even within different regions of the same country [6;7;8]. Azerbaijan is a country that is located in the South Caucasus region and situated at the crossroads of Southwest Asia and Southeastern Europe. with a population of 9.5 million and oil-based economy. It has borders with Georgia, Russia, Armenia, Turkey and Iran. The data on acute poisoning in Azerbaijan is very limited. There was only one study previously conducted [9]. The goal of this paper is to study the pattern of hospital-treated poisoning patients in Azerbaijan over the course of three years.

Methods. This prospective study was performed from 1st January 2014 to 31st December 2016 and included the data of all patients admitted to the Center of Clinical Toxicology of Ministry of Health of Azerbaijan Republic in the capital city, Baku.

Specialized medical toxicology service started in Azerbaijan in 1982. The Center of Clinical Toxicology (CCT) is the only medical institution in Azerbaijan dedicated to treatment of acute poisoning. There are several units within the department: ICU, adult, pediatric, dialysis and efferent therapy, hyperbaric oxygenation, laboratory and diagnostic units. In addition Poison Information service was established in 2010 and was supported by the World Health Organization.

The information was collected from patients' personal medical records to standardize the following data: age, sex, date of poisoning, time of arrival, toxic substance involved in exposure, reason of intoxication, severity of poisoning, methods of management, length of hospitalization, and the outcome.

Poisoning cases were classified according to ICD-10 codes (T36-T50 – poisoning by drugs, medicaments, and biological substances and T51-T65 - toxic effects of substances mainly nonmedicinal as to source).

All patients that were admitted to the hospital with allergic reactions to medications and chemical substances were excluded from this study.

The grade of intoxication was determined according to the IPCS/EC/EAPCCT poisoning severity score [10].

Results. Six thousand three hundred and forty-seven acute poisoned patients were admitted to CCT during the three-year period of study. None of the patients were excluded because of missing data. Two thousand seven hundred fifty-four (43.4%) of all cases were male, 3593 (56.6%) were female patients.

The youngest patient was 1 months old, the oldest - 93 years old. The mean age was 28.6±17.1 years old. Median age was 27 years old.

There were 1158 (18.2%) patients in the pediatric age group (0-14 years) and 5189 (81.8%) in the adult age group.

1598 patients (25.2%) were between 15 and 24 years old, 1597 (25.2%) were between 25 and 34 years old, 887 (14.0%) were between 35 and 44 years old, 578 (9.1%) were between 45 and 54 years old, 319 (5.0%) were between 55 and 64 years old, and 210 (3.3%) were ≥65 years old.

The distribution according to gender in different age groups is shown in **Fig. 1.**

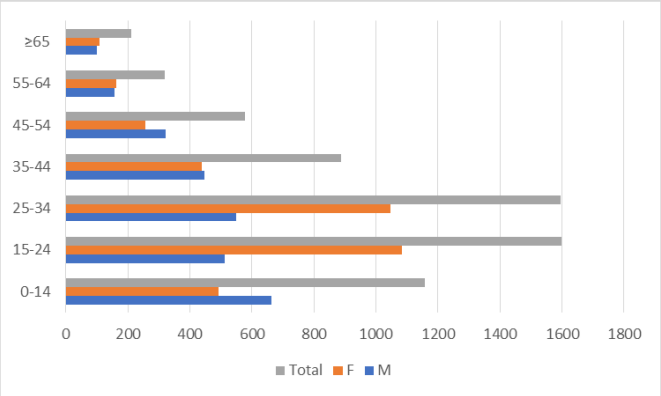

Fig. 1 The distribution according to gender in different age groups

In the adult age group, the mean age of men was 36.5±14.6 years old (min = 15, max = 86) and the mean age of women was 32.0±13.6 years old (min = 15, max = 93) (p<0.001). In the pediatric age group, the mean age was 4.99±3.47 years old (boys – 4.73±3.12 years, girls - 5.34±3.87 years; p=0.0023), the median age in pediatric group was 4 years old.

Of all admissions, 77.8% of patients were residents permanently living in Baku or suburbs of the capital city, and 22.2% of patients were from other regions of Azerbaijan.

Among all hospitalized acute poisoning cases, 2972 patients (46.8%) were suicide attempts. Of deliberate self-poisonings, 2019 (67.9%) were females and 953 (32.1%) were males.

Most of self-poisoning patients were between 15 and 24 years old (32.4%). The mean age of female patients with suicide attempts was 30.7±12.8 years old, male patients – 34.9±14.4 years old (p<0.001).

In the pediatric age group, the highest number of poisonings was in children who were 3 years old (Fig. 2).

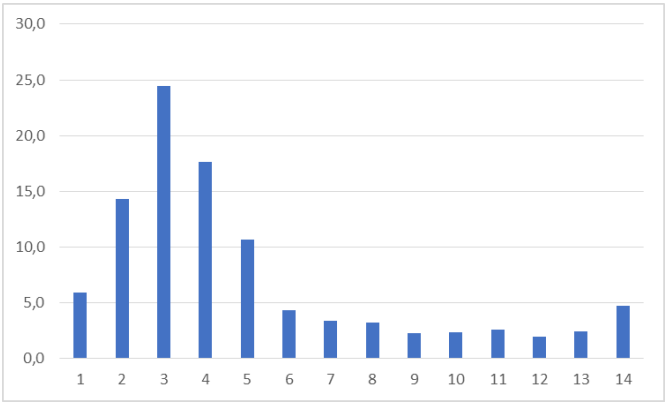

Fig. 2 The distribution according to age in pediatric group (%)

The average number of hospitalization per month was 176.3±27.34. The number of hospitalized patients increased in the winter and reached a maximum in December **(Fig. 3)**.

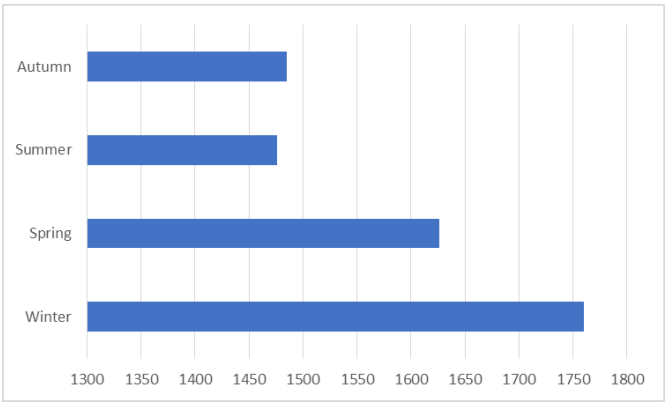

Fig. 3. The distribution of hospitalizations according to season

Among poisoning cases, the most common route of exposure was oral (70%), followed by inhalation (22%), and dermal/injection contact (8%).

Seventy-two percent of the patients arrived at the hospital within two hours of poisoning. The time of admission was as follows: 1081 (17.0%) patients arrived at toxicology center between 00:00 and 07:59, 2372 (37.4%) patients arrived between 08:00 and 15:59, and 2894 (45.6%) patients arrived between 16:00 and 23:59.

The average stay was 2.7±3.55 days (range 1-92 days).

A total of 28 (0.4%) patients had re-admissions due to self-poisoning during the study period.

According to the IPCS/EC/EAPCCT poisoning severity score, 0.1% of admitted patients had minor poisoning, 69.4% - moderate poisoning, 27.8% - severe poisoning and 2.7% - fatal poisoning.

Drug poisonings were the most common cause of admissions (40.9%), followed by poisonings by carbon monoxide (21.6%), corrosives (15.2%), alcohol (5.9%), snake, spider and insect bites (5.2%), pesticides (4.9%), organic solvent (4.5%), poisonous plants (1.2%), toxic gases (0.4%), soaps and detergents (0.2%), halogen derivatives of aliphatic and aromatic hydrocarbons (0.02%), inorganic substances (0.02%), metals (0.02%), other and unspecified substances (0.1%) **(Table 1)**.

Among the poisonings by drugs and biological substances (T36-T50) 49.7% of cases were intoxications by antiepileptic, sedative-hypnotic, antiparkinsonism, and other psychotropic drugs (T42/T43). Iminostilbenes (T42.1), benzodiazepines (T42.4), tricyclic antidepressants (T43.0) and neuroleptics (T43.3/4) were the most common among psychoactive medicines poisonings.

Males predominated among alcoholic intoxication (90.7%). According to our data, alcohol surrogate poisoning was extremely small. Only one case of alcohol substitute poisoning was recorded during the study period.

Among the corrosive substances (T54), the most common agent was poisoning by acids, and especially by concentrated acetic acid (78.0% of all patients in this cohort). Concentrated 70% acetic acid (also known as vinegar essence) is commonly used for making homemade pickles and is freely sold in grocery shops in Azerbaijan.

Among pesticides poisoning (T60) - organophosphates (47.1%), rodenticides (43.2%), and other pesticides (9.7%) were commonly ingested.

Seventy-eight percent of the patients who were admitted to CTC with envenomation (T63) had snakebites, 12% – hymenopteran stings (bee, wasp etc.), 7% - “black widow” spider stings and 3% - scorpion stings.

Among snakebites, 99.6% of patients had envenomation by Viperidae snakes with severe symptoms of coagulopathy, local edema and hemorrhage, which is common for most dangerous viper snake in Azerbaijan called “gyurza” (*Vipera lebetina*). Only 1 patient had neurotoxic manifestations typical for Elapidae snake envenomation. This patient arrived from the Iranian border southern region of Azerbaijan.

Poisoning due to noxious plants and mushrooms (T62) was low (1.2%). Death cup (*Amanita phalloides*), Jamestown weed (*Datura stramonium*), Castor bean (*Ricinus communis*), and Wild rue (*Peganum harmala*) were the most common plants involved in poisoning.

For the elimination of xenobiotics, gastric lavage was carried out for all cases of oral poisonings, including corrosives, organophosphates, and kerosene poisonings. No complications were recorded. Syrup of ipecac is not available in Azerbaijan.

Antidotes such as atropine, sodium thiosulfate, pyridoxine, vitamin K_1, sodium bicarbonate, naloxone, sodium DMPS (unithiol), polyvalent snake antivenom, and hyperbaric oxygen were applied to the relevant types of poisonings. Other important antidotes such as oximes, flumazenil, digoxin immune Fab, fomepizole, methylene blue, hydroxocobalamin, and several others are not available in Azerbaijan.

Table 1. The distribution of admissions and deaths according to ICD-10

ICD-10 code	Poisoning substance	Admission		Death		
		N	%	N	%	Mortality in group (%)
T36	Systemic antibiotics	17	*0,3*	0	*0,0*	*0,0*
T37	Other systemic anti-infectives and antiparasitics	75	*1,2*	0	*0,0*	*0,0*
T38	Hormones and their synthetic substitutes and antagonists	87	*1,4*	2	*1,2*	*2,3*
T39	Nonopioid analgesics, antipyretics, and antirheumatics	336	*5,3*	1	*0,6*	*0,3*
T40	Narcotics and psychodysleptics	195	*3,1*	9	*5,3*	*4,6*
T41	Anaesthetics and therapeutic gases	0	*0*	-	-	-
T42	Antiepileptic, sedative-hypnotic, and antiparkinsonism drugs	837	*13,2*	7	*4,1*	*0,8*
T43	Psychotropic drugs	452	*7,1*	3	*1,8*	*0,7*
T44	Drugs primarily affecting the autonomic nervous system	115	*1,8*	3	*1,8*	*2,6*
T45	Primarily systemic and haematological agents	155	*2,4*	0	*0,0*	*0,0*
T46	Agents primarily affecting the cardiovascular system	212	*3,3*	2	*1,2*	*0,9*
T47	Agents primarily affecting the gastrointestinal system	9	*0,1*	0	*0,0*	*0,0*
T48	Agents primarily acting on smooth and skeletal muscles and the respiratory system	65	*1,0*	0	*0,0*	*0,0*
T49	Topical agents primarily affecting skin and mucous membrane	8	*0,1*	0	*0,0*	*0,0*
T50	Diuretics and other and unspecified drugs and medicaments	31	*0,5*	0	*0,0*	*0,0*
T51	Alcohol	376	*5,9*	10	*5,8*	*2,7*
T52	Organic solvents	285	*4,5*	4	*2,3*	*1,4*
T53	Halogen derivatives of aliphatic and aromatic hydrocarbons	1	*0,02*	0	*0,0*	*0,0*
T54	Corrosive substances	964	*15,2*	99	*57,9*	*10,3*
T55	Soaps and detergents	6	*0,1*	0	*0,0*	*0,0*
T56	Metals	1	*0,02*	0	*0,0*	*0,0*
T57	Other inorganic substances	1	*0,02*	0	*0,0*	*0,0*
T58	Carbon monoxide	1374	*21,6*	15	*8,8*	*1,1*
T59	Other gases, fumes and vapours	25	*0,4*	2	*1,2*	*8,0*
T60	Pesticides	312	*4,9*	8	*4,7*	*2,6*
T61	Noxious substances eaten as seafood	0	*0,0*	-	-	-
T62	Noxious substances eaten as food	76	*1,2*	0	*0,0*	*0,0*
T63	Contact with venomous animals	328	*5,2*	6	*3,5*	*1,8*
T64	Aflatoxin and other mycotoxin food contaminants	0	*0,0*	-	-	-
T65	Other and unspecified substances	4	*0,06*	0	*0,0*	*0,0*
Total admissions with poisoning by drugs, medicaments and biological substances (T36-T50)		***2594***	***40,9***	**27**	***15,8***	***1,04***
Total admissions with toxic effects of substances chiefly nonmedicinal as to source (T51-T65)		***3753***	***59,1***	**144**	***84,2***	***3,84***
TOTAL:		***6347***	***100***	**171**	***100***	***2,69***

71% of severe poisoned patients received plasmapheresis, haemoperfusion, or hemodialysis.

One hundred seventy-one (2.7%) deaths were occurred during the study period (97 men and 74 women). Ninety-nine of them (57.9%) had poisoning by corrosive substances, of which 98 (99%) had poisoning by concentrated acetic acid.

The majority of deaths (86.0%) occurred due to suicide attempts, the others were due to accidental/unintentional poisonings.

Discussion. A female predomiance, as found in this study, was also reported in several studies conducted in Turkey [11;12] , Greece [13], South Africa [14] and Zimbabwe [15].

In this study, the most affected age groups were 15-24 and 25-34 years. These data consistent with investigation results from the other parts of world [16;17;18;19;20].

Our data shows that the number of poisoned patients increased in the winter and reached a maximum in December. This finding mostly related to CO intoxication and is in accordance with the study that was conducted in Turkey [21].

In the present study, unintentional poisonings predominated over deliberate poisonings, which is in discordance with findings in Turkey [22], Oman [23] and Iran [24], where suicidal poisonings were more common.

In agreement with the other studies [25;26] the most common route of exposure was oral. This is in discordance with Palestinian study where the most common route of poisoning was through stings [27].

Drug intoxication was the most common type of poisoning in this study. Similar results have been reported in Turkey [28], Iran [29] and Korea [30].

Alcohol consumption and overdose in Russia is a huge problem. Alcohol poisoning is also the most frequent cause of death in Russia. [31;32]. In Iran, where alcohol is religiously banned and illegal, it accounted for 2.7% of poisoning admissions [33].

Although Muslims constitute 90% of the population of Azerbaijan, only small minority of them strictly adhere to the religious rules. In this study alcohol intoxication compromised 5.9% of all poisoning admissions, which is higher than Iran [34] and Turkey [35], but lower than in Norway [36] and Singapore [37]. Studies conducted in Russia showed that males more often presented with alcohol intoxication than females [38].

In Russia, corrosives are one of the main categories of toxic agents causing poisonings (up to 21.8%). Hospital mortality rate of acetic acid poisoning was 13.6% [39]. Concentrated acetic acid in Russia, as well as in Azerbaijan is available in almost every grocery shop. In our study, corrosive substances poisoning ratio was 15% and the level of hospital mortality of acetic acid poisoning was 13.0%. In Turkey [40] only 1.8% of poisoned patients ingested corrosives.

Carbon monoxide poisoning is a significant problem in Azerbaijan, particularly during the colder times of the year. The vast majority of these cases were associated with violations of the domestic gas appliances safety instructions. In Turkey, carbon monoxide poisoning is mainly associated with problems of using traditional coal or wood stoves [41;42]. In Iran, as well as in Azerbaijan, gas water heaters were the main cause of CO exposure [43].

Pesticide poisoning in rural areas of Turkey reach up to 8.8% of all calls to the Poison Information Center [44]. In many other developing countries poisoning by pesticides is also a serious problem [45]. In our study, we found that only 4.9% of all admissions were due to pesticide poisoning.

In Tehran (Iran), narcotics were the second most common cause (31%) of poisoning after pharmaceutical drugs [46]. In Georgia, narcotic drug poisoning level was 10% [47]. In Azerbaijan, we found that among total admissions with acute poisoning by medical substances (T36-T50) - narcotic intoxication accounts for 7.5%. Most of these cases constitute a heroin overdose.

This studies showed that the most common case of envenomation was snakebites (78.4%). In Mashhad (Iran), scorpion sting was the dominant subgroup of poisoning by natural origin [48].

Conclusion. Despite of limitations in this hospital-based study, we obtained significant data about the current toxicoepidemiological situation in Azerbaijan. Because of very limited number of epidemiological studies on the structure of acute poisoning in Azerbaijan, there was no previous data available to compare current results.

At the same time this study showed that acute poisonings are the serious problem for public health system in Azerbaijan Republic.

Efforts should be aimed to create public awareness regarding proper storage, use, and disposal of household chemicals (especially acetic acid) and drugs. Educational and preventive programs for vulnerable population as well as establishing poison control centers in other parts of Azerbaijan could also help to prevent poisonings.

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