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**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.1019429>Available online at: <http://www.iajps.com>**Research Article****COMPARATIVE CHARACTERISTICS OF THE STRUCTURES OF ACUTE DRUG POISONING IN THE ULYANOVSK REGION AND THE REPUBLIC OF MORDOVIA****Artur Amirovich Almukhametov^{1*}, Alena Evgenievna Kormishina², Praskovia Georgievna Mizina³, Natalia Sergeevna Eliseeva², Aleksey Vladimirovich Shulaev⁴**¹ Kazan Federal University, Kremlyovskaya St, 18, Kazan, Respublika Tatarstan, Russia, 420008² Ulyanovsk State University, ul. Lva Tolstogo, 42, Ulyanovsk, Ulyanovskaya oblast', Russia, 432000³ Federal State Scientific Institution "All-Russian Research Institute of Medicinal and Aromatic Plants", Moscow, Russia⁴ Kazan State Medical University, The Ministry of Health of the Russian Federation, Butlerova, 49, Kazan, Respublika Tatarstan, Russia, 420012.**Abstract:**

Aim: At present, humanity is synthesized more than 80 mln of new chemicals and drugs on their basis. Constant contact with these substances is inevitable. More than 150 thousand of them are in constant circulation in production and daily life. The extensive use of them in the activities of modern man leads to an increased risk of acute exposure of chemicals (industrial, household and criminal poisoning) [1].

Attention is drawn to the rapid increase in the number of acute drug poisonings. This trend is due to the rapid growth of chemical production and pharmaceutical industries, poorly controlled sales and irrational use of medicines [2].

This situation is typical for such large regions of the Volga Federal District, as the Ulyanovsk region and the Republic of Mordovia. The aim is to compare the characteristic structures of acute drug poisoning, based on the statistics of Rosпотребнадзор in the Ulyanovsk region and in the republic of Mordovia; to identify common patterns and differences, for the planning of targeted detoxification and preventive measures.

Materials and methods: Retrospective screening study, based on the statistical form 12-07 "Information on the results of toxicological monitoring" (in the revised version - 12-12) and emergency notifications about the cases of acute poisoning of chemical etiology, in the amount of 8975 - for the Ulyanovsk region, and 5164 for the Republic of Mordovia, was carried out. The design of the study was chosen - descriptive transverse (one-stage). The results of the study were processed using the IBM SPSS Statistics 20. To compare the values, Pearson's Chi-square test was used.

Results and conclusion: These studies show, that the drug poisoning occupies the second place in the general structure of chemical etiology poisonings. This necessitates in-depth study of the problem of acute drug poisonings.

Keywords: acute poisoning, drugs, chemicals, mortality.

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INTRODUCTION:

Acute poisoning with chemical and medicinal substances is a common specific, severe type of pathology, which often leads to fatal cases. Together with accidents and injuries, they occupy leading positions in the structure of mortality causes, getting ahead of oncological diseases [3].

A similar situation is observed in such large regions of the Volga Federal District as the Ulyanovsk Region and the Republic of Mordovia.

Work objective. Comparative characteristics of the structure of acute poisoning with drugs, based on statistical data from the Ulyanovsk region and the Republic of Mordovia, for the planning of targeted detoxification and preventive measures.

MATERIALS AND METHODS OF THE RESEARCH:

The investigations of the circumstances and the structure of acute poisonings were carried out on the basis of statistical data of the Federal Service for Supervision over Consumer Rights Protection and Human Welfare (Rospotrebnadzor) in the Ulyanovsk Region and the Republic of Mordovia. It receives and processes emergency notifications about acute poisoning of chemical etiology (registration form 58-1/y) from all municipal and state medical organizations, and forms a database on their basis in the software package "Automated information system of social-hygienic monitoring" [4, 5].

Medical aid appealability in cases of acute poisoning of chemical etiology, and also lethality for this reason, were studied by the method of documentary observation, on the basis of data from the admission

offices of 19 medical organizations in the Ulyanovsk region and 21 in the Republic of Mordovia, providing specialized medical care.

Complete retrospective screening study of the data of statistical form 12-07 "Information on the results of toxicological monitoring" (in the revised version - 12-12) and emergency cases of acute poisoning of chemical etiology (hereinafter - urgent notifications) in the amount of 8975 - for the Ulyanovsk region, and 5164 for the Republic of Mordovia, was carried out. The design of the study was chosen - descriptive transverse (one-stage).

The results of the study were processed using the IBM SPSS Statistics 20. To compare the values, measured in a nominal scale, Pearson's Chi-square test was used [6].

RESULTS AND DISCUSSION:

For the period from 2012-2015, according to the expedited reports, among the population of the Ulyanovsk region, there were 8975 cases of acute poisoning with substances of chemical etiology, including 2061 –followed by death. In the Republic of Mordovia, the number of emergency notifications for the same period was 5164, including 831 - followed by death. Mortality was 23.0% in the Ulyanovsk region, and 16.1% in the Republic of Mordovia. The differences were statistically significant ($p < 0.001$). The comparison of figures showed, that during the reporting period, the fatal cases, caused by chemical poisoning, in the Ulyanovsk region were 1.44 times more often, than in the Republic of Mordovia.

The structure of chemical poisoning by toxic substances is presented in Table 1.

Table 1: The structure of acute poisoning of chemical etiology by toxic substances, for 2012-2015

Toxic substance	Total number of patients, persons			
	The Ulyanovsk region		The Republic of Mordovia	
	Abs.	%	Abs.	%
Alcohol and its surrogates	3607	40,4	2731	53,0
Medicinal products	2487	27,7	1087	21,0
CO and other vapors, gases	995	11,1	436	8,5
Preparations of household and industrial chemistry	752	8,3	459	8,8
Vegetable and animal poisons	499	5,5	111	2,2
Acetic essence	263	2,9	261	5,0
Narcotic drugs and psychodysleptic drugs (hallucinogens)	223	2,5	18	0,3
Pesticides	149	1,6	61	1,2
TOTAL:	8975	100,0	5164	100,0

Table 2: Fatal cases among the population, due to the acute poisoning of chemical etiology in the context of toxic substances for 2012-2015

Toxic substance	The frequency of fatal cases, persons				p
	The Ulyanovsk region		The Republic of Mordovia		
	Abs.	%	Abs.	%	
CO and other vapors, gases	550	55,3	260	59,6	0,152
Aceticessence	124	47,1	47	18,0	<0,001*
Alcohol and its surrogates	1069	29,6	448	16,4	<0,001*
Narcotic drugs and psychodysleptic drugs (hallucinogens)	58	26,0	2	11,1	0,176
Preparations of household and industrial chemistry	185	24,6	61	13,2	<0,001*
Medicinal products	69	2,8	9	0,8	<0,001*
Vegetable and animal poisons	6	1,2	3	2,7	0,223
Pesticides	0	0,0	1	1,6	-
TOTAL:	2061	23,0	831	16,1	<0,001*

* - differences of indicators are statistically significant ($p < 0.05$)

According to the received data, statistically significant differences in the division of acute poisoning cases by toxic substances were established, depending on the region ($p < 0.001$). It should be noted, that the first place in the studied regions is occupied by poisoning with alcohol and its surrogates (the Ulyanovsk region - 40.4%, the Republic of Mordovia - 53.0%), the second place –by poisoning with medicines (the Ulyanovsk region - 27.7%, the Republic Mordovia - 21.0%); the third place is occupied by poisonings with carbon monoxide and other vapors and gases (the Ulyanovsk region - 11.1%, the Republic of Mordovia - 8.5%).

An assessment of the fatal cases among the patients for each of the toxic substances was also performed (Table 2).

It should be noted, that despite the high prevalence, poisoning with medicines is characterized by low mortality (2.8% in the Ulyanovsk region, 0.8% in the Republic of Mordovia). When comparing regions, these indicators had statistically significant differences ($p < 0.001$).

The highest mortality rate was observed in cases of CO and other gases (vapors) poisoning (the Ulyanovsk region -55.3%, the Republic of Mordovia-59.6%), mortality rates on the ground of poisoning with acetic essence and alcohol or its surrogates were in the second and the third places, respectively. The levels of lethality in cases of poisoning by various substances are compared in Figure 2.

Next, a comparison was made of the gender and age structure of drug substance poisoning in the compared regions (Table 3).

Table 3: Age and gender structure of poisoning with medicinal preparations in the compared regions for 2012-2015.

Category of patients	Description of category	The Ulyanovsk region		The Republic of Mordovia		p
		Abs.	%	Abs.	%	
Gender	Male	995	40,0	391	36,0	0,022*
	Female	1492	60,0	696	64,0	
Age, complete years	0-14	393	15,8	447	41,1	<0,001*
	15-17	147	5,9	68	6,3	
	18 and older	1947	78,3	572	52,6	

* - differences of indicators are statistically significant ($p < 0.05$)

Table 4: The structure of drug poisoning in the compared regions in 2012-2015, by the social status of patients.

Social status of patients	The Ulyanovsk region		The Republic of Mordovia	
	Abs.	%	Abs.	%
Working people	648	26,1	272	25,0
Unemployed people of working age	1217	48,9	413	38,0
Pensioners	323	13,0	196	18,0
Students of universities and specialized secondary schools	75	3,0	10	0,9
Schoolchildren	101	4,1	64	5,9
Children, attending pre-school facilities	24	1,0	35	3,2
Disorganized children	99	4,0	97	8,9
TOTAL:	2487	100,0	1087	100,0

According to the presented table, it was found, that in both regions the largest proportion of people, who were poisoned with medicines, were women (60.0% in the Ulyanovsk region, 64.0% in the Republic of Mordovia), while the proportion of women in the Republic of Mordovia was significantly higher ($p = 0.022$). Statistically significant differences ($p < 0.001$) were also defined, when comparing the division of cases of drug poisoning by age groups. It was found a significantly higher proportion of children under 14 years of age and a lower proportion of adult patients aged 18 and older in the Republic of Mordovia (41.1% and 52.6%, respectively), compared with the Ulyanovsk region (15.8% and 78.3%, respectively). The results of comparison of the structure of patients, poisoned with drugs by social status are presented in Table 4.

According to our research, unemployed citizens of working age constituted the largest part in the

structure of cases of drug poisoning (48.9% in the Ulyanovsk region, 38.0% in the Republic of Mordovia). In the second place were working citizens (26.1 and 25.0%, respectively), in the third place - pensioners (13.0 and 18.0%, respectively). Among patients under the age of 14, the largest share of drug poisoning was registered for disorganized children (4.0 and 8.9%, respectively).

When comparing the structure of drug poisoning by social status, statistically significant differences were established between the regions ($p < 0.001$). This fact can be explained by a larger proportion of unemployed patients of working age and a smaller proportion of pensioners and disorganized children, according to the data of the Ulyanovsk region.

When studying the structure of drug poisoning in the compared regions for 2012-2015, by specific pharmacological groups of toxicants, the following division was obtained (Table 5).

Table 5: The structure of acute drug poisoning in the Ulyanovsk region and the Republic of Mordovia in 2012-2015, by pharmacological groups.

Pharmacological group	The Ulyanovsk region		The Republic of Mordovia	
	Abs.	%	Abs.	%
Psychotropic drugs	609	24,5	332	30,5
Anticonvulsants, sedatives, hypnotics, antiparkinsonics	373	15,0	228	21,0
Narcotic drugs and psychodysleptic drugs	179	7,2	71	6,5
Medications for cardiovascular system	177	7,1	82	7,5
Analgesics, antipyretic and antirheumatic drugs	70	2,8	27	2,5
Agents of systemic and hematologic action	57	2,3	54	5,0
Drugs, affecting the VNS	37	1,5	13	1,2
Antimicrobial and antiparasitic agents	25	1,0	18	1,7
Antibiotics of systemic action	30	1,2	15	1,4
Diuretics, hormones, antiseptics and other unspecified drugs	930	37,4	247	22,7
TOTAL:	2487	100,0	1087	100,0

Table 6: The level of mortality as a result of drug poisoning in the Ulyanovsk region and the Republic of Mordovia in 2012-2015, in the context of pharmacological groups

Pharmacological group	The Ulyanovsk region		The Republic of Mordovia		p
	Abs.	%	Abs.	%	
Narcotic drugs and psychodysleptic drugs	27	15,1	3	4,2	0,031*
Psychotropic drugs	22	3,6	3	0,9	0,016*
Anticonvulsants, sedatives, hypnotics, antiparkinsonics	4	1,1	2	0,9	0,841
Analgesics, antipyretic and antirheumatic drugs	1	1,4	0	0,0	-
Medications for cardiovascular system	2	3,5	0	0,0	-
Drugs, affecting the VNS	1	2,7	0	0,0	-
Agents of systemic and hematologic action	0	0,0	0	0,0	-
Antimicrobial and antiparasitic agents	0	0,0	0	0,0	-
Antibiotics of systemicaction	0	0,0	0	0,0	-
Diuretics, hormones, antiseptics and other unspecified drugs	12	6,8	1	1,2	0,112
TOTAL:	69	2,8	9	0,8	<0,001*

* - differences of indicators are statistically significant ($p < 0.05$)

The data in Table 6 show, that the largest group in the overall structure of drug toxicationis poisoning with psychotropic drugs (antidepressants, antipsychotics, barbiturates, benzodiazepines). They account for 24.5% of cases in the Ulyanovsk region and 30.5% in the Republic of Mordovia. The second place is occupied by poisonings with anticonvulsant, sedative, hypnotics, and antiparkinsonics medications (15.0% and 21.0%, respectively). In the compared regions, poisoning with narcotic drugs and psychodysleptic drugs (hallucinogens) (7.2% and 6.5%, respectively), as well as poisoning with medications for cardiovascular system (7.1% and 7.5% respectively) were in the third place. When comparing the structure of drug poisoning by pharmacological groups, statistically significant differences were established between regions ($p < 0.001$).

The results of comparing the mortality rates in the context of pharmacological groups of toxicants, according to the data of the Ulyanovsk region and the Republic of Mordovia were as follows (table 6).

According to the results of the ranking, it was found that the cases of poisoning with narcotic drugs and psychodysleptic drugs were the causes of death the most often (in the Ulyanovsk region - 15.1%, in the Republic of Mordovia - 4.2%), while there were significant differences in the levels of the indicator in the compared regions ($p = 0.031$). Psychotropic drugs were in the second place at the rate of mortality (3.6 and 0.9%, respectively).

It should also be noted both high prevalence and a significant level of fatal cases as a result of poisoning with diuretics, hormones, antiseptics and other medicines.

SUMMARY

Acute drug poisoning is a very serious danger for public health. Constant monitoring, systematization, analysis and study of data allow timely and rational solution of problems, connected with chemical, and above all, drug, safety.

According to our data, drug poisonings are highly prevalent and constituted a large part in the structure of all chemical poisonings during the period of the research (27.7% in the Ulyanovsk region and 21.0% in the Republic of Mordovia). Moreover, in the structure of acute poisonings of chemical etiology, the rate of mortality as a result of poisoning with medicinal drugs is lower, than due to the poisoning with substances from other groups. Perhaps, this is connected with the presence of specific antidotes.

CONCLUSIONS:

When studying the pharmacological structure of toxicants, which were the cause of acute poisoning, we found a tendency to a high incidence of poisoning with prescription drugs, that required additional investigation of the objectivity of prescribing, the use and sale of medicines.

The results of this study proved the need for a deeper study of the problem of acute drug poisoning: on the one hand, through additional development and strengthening of preventive measures, on the other hand – by means of improvement of detoxification measures.

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