

FATAL POISONINGS IN THE CITY OF ZAGREB

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The paper deals with the results of analysis of fatal poisonings in the city of Zagreb from 1981 to 1990. The work is an extension of earlier analyses for the same area that were carried out from the foundation of the Department for Forensic Medicine and Criminology, School of Medicine, University of Zagreb in 1934 to 1967, and from 1968 to 1980. Comparative analysis of all data shows that despite the increasing rate of poisoning the number of cases of fatal poisoning has been steadily diminishing - from 11 cases per 100.000 population in the 1934-1967 period and eight cases between 1968 and 1980 to five cases in the latest period 1981-1990.

Key terms: accidental poisoning, alcohol, carbon monoxide, corrosives, homicide, pesticides, poisonings, postmortem examination, suicide

Analysis of fatal poisonings in the city of Zagreb dates back to 1934, the year of foundation of the Institute for Forensic Medicine and Criminology (1, 2). This work is a continuation of the analysis and encompasses the interval from 1981 to 1990. To facilitate comparison of these results with those of analyses carried out between 1934 and 1967 and then between 1968 and 1980 the same manner of presentation was applied to all data, in tables by year, mode of poisoning, type of poison, age of the poisoned, sex and occupation.

The number of poisonings has been on the increase owing to the presence of an ever-larger amount of chemical substances in the human environment. If the rising trend in the use of narcotics is also taken into account, poisonings tend to grow into a major public health problem. Fatal poisonings have not become proportionately more numerous. On the contrary, their number demonstrates a steady decrease (3-10).

RESULTS AND DISCUSSION

Data for analysis were taken from the medical records of the Institute for Forensic Medicine and Criminology of the School of Medicine, University of Zagreb in Zagreb. Between 1981 and the end of 1990 altogether 15.908 autopsies were performed in the

Institute. In all 424 deaths were due to poisoning, which makes the mean annual rate of 42 cases of poisoning with a lethal issue, or five deaths from poisoning per 100.000 city inhabitants. From the overall number of city inhabitants and the number of deaths as registered for the same ten-year period by the Zagreb Centre for Economic Development, the Bureau of Statistics, it follows that an average of 17.90 per cent of all deceased persons were referred to the Institute for Forensic Medicine and Criminology for a postmortem examination. The mean mortality rate per 100.000 city inhabitants per year was 990 persons of whom 4.88 per thousand died of poisoning. In 2.69 per cent of all autopsies carried out in the Institute a toxic substance was established as the cause of death (Table 1).

Table 1. The number of cases of fatal poisoning in relation to the number of inhabitants, the number of deaths and the number of autopsies in the city of Zagreb

Year	Number					‰		%	
	Inhabitants	Deaths	Autopsies	Fatal poisonings	Deaths per 100.000 inhabitants	Fatal poisonings per 100.000 inhabitants	Fatal poisonings per no. of deaths	Autopsies per no. of deaths	Fatal poisonings per no. of autopsies
1981	858600	8344	1422	43	972	5	5.15	17.04	3.02
1982	862100	8345	1537	39	968	5	4.67	18.42	2.54
1983	866300	8948	1644	40	1033	5	4.47	18.37	2.43
1984	869800	8960	1753	31	1030	4	3.46	19.56	1.77
1985	873100	9609	1575	30	1100	3	3.12	16.39	1.91
1986	917400	8684	1622	41	947	4	4.72	18.68	2.53
1987	927000	8880	1800	49	958	5	5.52	20.27	2.72
1988	933300	9049	1625	48	970	5	5.30	17.96	2.95
1989	941700	9116	1483	51	968	6	5.59	16.27	3.44
1990	948000	9047	1447	52	954	5	5.75	15.99	3.59
Total:			15908	424					
Mean:					990	5	4.88	17.90	2.69

Table 2 shows that in the total number of deaths those classified as accidental were more numerous than deaths by suicide, the respective percentages being 69.14 and 30.39. Over the analysed ten-year period there were two cases of homicide that were caused by poisoning.

In the column headed »the number of fatal poisonings« in Table 2 the figures in parentheses refer to the poisonings that were attributed to a combination of poisons.

The majority of fatal poisonings in Zagreb, or 46.40 per cent, were ascribed to poisoning by carbon monoxide. Alcohol poisoning was the cause of death in 21.35 per cent of the cases, pesticides in 9.51 per cent, and corrosives (acids and bases, cleaning materials) in 7.42 per cent. Carbon monoxide poisoning as a result of accident or suicide was the most frequent cause of death among men (105 and 22 deaths). Sixty-five men died of accidental poisoning by alcohol, and 14 of pesticide poisoning. As a means for committing suicide, apart from carbon monoxide, 14 men used pesticides and 13 made use of corrosive agents for that purpose. Accidental poisoning with carbon monoxide proved to be fatal for 60 women, alcohol poisoning for 26 women. Sixteen women committed suicide by using corrosive toxic substances, 12 used non-barbiturates and 11 carbon monoxide (Table 3).

Table 2. The mode of poisoning in relation to the number of fatal poisonings

Year	Number of fatal poisonings	Mode of poisoning					
		Accident		Suicide		Homicide	
		n	%	n	%	n	%
1981	43	27	62.79	16	37.21		
1982	39(41)	26	63.41	15	36.59		
1983	40	30	75.00	10	25.00		
1984	31	25	80.65	6	19.35		
1985	30	22	73.33	8	26.67		
1986	41(42)	29	69.05	13	30.95		
1987	49	42	85.71	5	10.20	2	4.08
1988	48(49)	25	51.02	24	48.98		
1989	51(52)	34	65.38	18	34.62		
1990	52(54)	38	70.37	16	29.63		
Total:	424(431)	298		131		2	
Percentage:		69.14		30.39		0.46	

Table 3. Poisonings by type of poison

Type of poison	Accident			Suicide			Homicide			Total			%
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	
Carbon monoxide	105	60	165	22	11	33	2	2	127	73	200	46.40	
Alcohol	65	26	91	1		1			66	26	92	21.35	
Barbiturates				5	6	11			5	6	11	2.55	
Non-barbiturates	3	2	5	9	12	21			12	14	26	6.03	
Narcotics	3	1	4	1		1			4	1	5	1.16	
Corrosives	1	2	3	13	16	29			14	18	32	7.42	
Pesticides	14	3	17	14	10	24			28	13	41	9.51	
Hydrogen cyanide				3	2	5			3	2	5	1.16	
Mushrooms	9	2	11	1		1			10	2	12	2.78	
Other poisons	2		2	4	1	5			6	1	7	1.62	
Total:	202	96	298	73	58	131	2	2	275	156	431		
Percentage:	67.79	32.21		55.73	44.27		100.00		63.81	36.19			

Table 4 shows the number of accidental deaths in relation to the number of suicides expressed in percentages by type of poison.

Analysis by age shows that 36.14 per cent of the male population who died of accidental poisoning were in the 36-50 age range. The greatest percentage of deaths was due to carbon monoxide, 51.98, and alcohol, 32.18. Accidental carbon monoxide poisoning was also the most frequent cause of death for male children under the age of five years (Table 5).

Out of the total female population reported to have died of accidental poisoning 27.08 per cent was older than 66. Carbon monoxide caused death in 62.50 per cent of the victims, followed by alcohol with 27.08 per cent. Carbon monoxide likewise was the commonest cause of accidental fatal poisoning among children of female sex, from infancy to the age of 15 (Table 6).

Table 4. The number of accidental deaths in relation to the number of suicides expressed in percentages by type of poison

Type of poison	Accident		Suicide	
	M	F	M	F
Carbon monoxide	51.91	62.50	30.14	18.97
Alcohol	32.18	27.08	1.37	
Barbiturates			6.85	10.34
Non-barbiturates	1.49	2.08	12.33	20.69
Narcotics	1.49	1.04	1.37	
Corrosives	0.50	2.08	17.81	27.59
Pesticides	6.93	3.13	19.18	17.24
Hydrogen cyanide			4.11	3.45
Mushrooms	4.46	2.08	1.37	
Other poisons	0.99		5.48	1.72
Total %	67.79	32.21	55.73	44.27
Total number of fatal poisonings	202	96	73	58

Table 5. Accidental fatal poisonings by type of poison and age in the male population

Type of poison	Age								Total	
	0 - 5	6 - 15	16 - 25	26 - 35	36 - 50	51 - 65	Age 66 and above	Un-known	n	%
Carbon monoxide	12	3	16	10	26	20	15	3	105	51.98
Alcohol			5	7	37	12	3	1	65	32.18
Non-barbiturates				2		1			3	1.49
Narcotics					2				3	1.49
Corrosives				1					1	0.50
Pesticides				1	6	5	2		14	6.93
Mushrooms	1	4		1	1	2	1		9	4.46
Other poisons				1	1				2	0.99
Total:	13	7	21	23	73	40	21	4	202	
Percentage:	6.44	3.47	10.40	11.39	36.14	19.80	10.40	1.98		

Table 6. Accidental fatal poisonings by type of poison and age in the female population

Type of poison	Age								Total	
	0 - 5	6 - 15	16 - 25	26 - 35	36 - 50	51 - 65	Age 66 and above	Un-known	n	%
Carbon monoxide	2	5	11	6	3	8	24	1	60	62.50
Alcohol				1	15	10			26	27.08
Non-barbiturates				1	1				2	2.08
Narcotics				1					1	1.04
Corrosives					2				2	2.08
Pesticides					2		1		3	3.13
Mushrooms		1					1		2	2.08
Other poisons										
Total:	2	6	11	9	23	18	26	1	96	
Percentage:	2.08	6.25	11.46	9.38	23.96	18.75	27.08	1.04		

Among men in the 36-50 age group the percentage of those who committed suicide by poisoning was 34.25. For as many as 22, or 30.14 per cent, poisoning was due to carbon monoxide, 14 men used pesticides and 13 corrosives (Table 7).

Table 7. Suicides by type of poison and age in the male population

Type of poison	Age							Total	
	0 - 5	6 - 15	16 - 25	26 - 35	36 - 50	51 - 65	Age 66 and above	n	%
Carbon monoxide			2	3	7	7	3	22	30.14
Alcohol					1			1	1.37
Barbiturates				1		2	2	5	6.85
Non-barbiturates			1		7	1		9	12.33
Narcotics								1	1.37
Corrosives			1	2	5	2	3	13	17.81
Pesticides			1	3	3	5	2	14	19.18
Hydrogen cyanide			1		2		1	3	4.11
Mushrooms								1	1.37
Other poisons				1		2	1	4	5.48
Total:			7	10	25	19	12	73	
Percentage:			9.59	13.70	34.25	26.03	16.44		

Like men, the majority of women, 32.76 per cent, committed suicide between the ages of 36 and 50. Sixteen did it by self-administering corrosives, 12 non-barbiturate drugs and 11 carbon monoxide (Table 8).

Table 8. Suicides by type of poison and age in the female population

Type of poison	Age							Total	
	0 - 5	6 - 15	16 - 25	26 - 35	36 - 50	51 - 65	Age 66 and above	n	%
Carbon monoxide			2	2	2	1	4	11	18.97
Alcohol									
Barbiturates			1		3	1	1	6	10.34
Non-barbiturates				2	3	4	3	12	20.69
Narcotics									
Corrosives					8	4	4	16	27.59
Pesticides			1		3	3	3	10	17.24
Hydrogen cyanide					1	1		2	3.45
Mushrooms									
Other poisons						1		1	1.72
Total:			4	4	20	15	15	58	
Percentage:			6.90	6.90	34.48	25.86	25.86		

From the point of view of occupation, 24.13 per cent of all cases of fatal poisoning involved retired persons, 15.55 per cent workers and 8.35 per cent housewives. The column »other occupations« in Table 9 refers to all occupations that could not be included under those specified (free-lance, artistic, low-income and unknown occupations).

Table 9. The type of poison in relation to occupation

Occupation	CO	Alcohol	Barbiturates	Non-barbiturates	Narcotics	Corrosives	Pesticides	HCN	Mushrooms	Other poisons	Total	
											n	%
Children under 7 years	17						1		3		21	4.87
School children and students	14	2		1					3		20	4.64
Housewives	7	10		3		8	7		1		36	8.35
Employees	8	7	1	1		1					18	4.18
Workers	27	26	1	2		5	3	1		2	67	15.55
Craftsmen	12	12		1			1	1			27	6.26
Medical personnel	4	2	1	1		1					9	2.09
Chemists	4										4	0.93
Farmers	3	2					13	1	1	1	21	4.87
Retired persons	72	6	6	7		5	3	1	2	2	104	24.13
Other occupations	32	25	2	10	5	12	13	1	2	2	104	24.13
Total:	200	92	11	26	5	32	41	5	12	7	431	

Carbon monoxide poisoning was the cause of death for 80.96 per cent of the children of less than seven years of age, 70.00 per cent of school children and students, 69.23 per cent of retired persons, 40.30 per cent of each employees, craftsmen and medical personnel, for 40.30 per cent of workers, 19.44 per cent of housewives, and for all chemists – four of them.

Alcohol poisoning was fatal for 44.44 per cent of craftsmen, 38.8 per cent of workers, 27.78 per cent of housewives and 22.22 per cent of medical personnel.

Pesticide poisoning had a lethal outcome for 61.90 per cent of farmers and 19.44 per cent of housewives. The same percentages applied to corrosive toxic agents (Table 9).

In the population of school children and students the mortality from accidental poisoning exceeded the mortality from suicide by as much as ninefold. The respective ratio for craftsmen was 8:1, for workers and farmers 3:1, for employees 2.6:1, for housewives and retired persons 2:1, and for medical personnel 1.5:1. Only for the chemists the rate of fatal suicidal poisoning was three times as high as that of accidental poisoning (Table 10).

Table 10. The number of accidental poisonings and the number of suicides in relation to occupation

Occupation	Accidents				Suicides			
	M	F	Total	% of all poisonings	M	F	Total	% of all poisonings
School children and students	11	7	18	90.00	1	1	2	10.00
Housewives		23	23	65.71		12	12	34.29
Employees	5	8	13	72.22	4	1	5	27.78
Workers	42	8	50	74.63	10	7	17	25.37
Craftsmen	24		24	88.88	3		3	11.12
Medical personnel	2	3	5	55.56	2	2	4	44.44
Chemists	1		1	25.00	1	2	3	75.00
Farmers	15	1	16	76.19	4	1	5	23.81
Retired persons	39	29	68	66.02	14	21	35	33.98

CONCLUSION

Based on comparative analysis of medical records on fatal poisonings for the periods 1934-1967, 1968-1980 and 1981-1990 kept at the Institute for Forensic Medicine and Criminology of the Medical School University of Zagreb the following indicators of trends become apparent:

	1934-1967	1968-1980	1981-1990
The number of fatal poisonings per 100.000 inhabitants	11	8	5
The proportion of fatal poisonings to the total number of deaths	12.10 %	8.93 %	4.88 %
The proportion of fatal poisonings to the total number of autopsies	6.57 %	4.46 %	2.69 %
The ratio of deaths by suicide to accidental deaths	2 : 1	1 : 2	1 : 2
Proneness to accidental poisoning by occupation	1. housewives 2. workers 3. employees	1. workers 2. retired persons 3. housewives	1. retired persons 2. workers 3. housewives
Poisons by incidence	1. carbon monoxide 2. corrosives 3. alcohol	1. carbon monoxide 2. alcohol 3. corrosives	1. carbon monoxide 2. alcohol 3. pesticides
The number of fatal poisonings caused by narcotics	-	-	5

In the latest analysed period, 1981-1990, five cases of fatal poisoning by narcotics (heroin or similar drugs) were registered for the first time.

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Sažetak

SMRTNA OTROVANJA U GRADU ZAGREBU

Analizirani su smrtni slučajevi otrovanja na području grada Zagreba za razdoblje od 1981. do 1990. godine. Analiza je nastavak ranijih proučavanja smrtnih otrovanja na području grada, od osnutka Zavoda za sudsku medicinu i kriminalistiku Medicinskog fakulteta Sveučilišta u Zagrebu 1934. godine do 1967. godine, te od 1968. do 1980. godine. Unatoč sve većem broju otrovanja analiza između ostaloga pokazuje stalni pad broja smrtno otrovanih, od 11 osoba na 100.000 stanovnika grada između 1934. i 1967. godine, na osam smrtno otrovanih u vremenu između 1968. i 1980. godine, na pet stanovnika na 100.000 stanovnika grada Zagreba u vremenu od 1981. do 1990. godine.

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