

Retrospective study of intoxication-related deaths in Republic of North Macedonia, 2010-2020

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Introduction

Use or abuse of both, licit and illicit drugs present a global public health issue. Combination of two or more substances at the same time can lead to serious life-threatening conditions, sometimes resulting with fatal intoxication.

Objective

Overview of death cases in the Republic of North Macedonia in order to determine the pattern of fatal intoxications.

Materials and methods

- In this study were used toxicological findings of autopsies performed at the Institute of Forensic Medicine, criminology and medical deontology, Medical Faculty – Ss. Cyril and Methodius University in Skopje in the period of 2010-2020.
- Only cases with intoxication as cause of death were included.
- The data was divided in two categories: mono-intoxications and mixed-intoxications (Figure 1). Within the categories there are multiple subcategories (Figure 2 and 3).
- Toxicologically relevant substances as well as age and gender were used as variables.
- Statistical evaluation included descriptive statistic and Mann-Whitney-U test.

Results

- 217 cases were due to intoxication, of which 43 (19.82%) caused by single substance, whilst 174 (80,18%) cases were due to intoxication with more than one substance (mixed-intoxication). (Fig.1)
- The highest number of fatal intoxications, 29 cases, were noticed in 2018. (Fig.4)
- According to age, there was statistically significant difference between the groups (mono- and mixed-intoxication) ($z = -3,97029$, $p = 0,00008$), observing that victims of mono-intoxication were older. (Table 1 and 2)
- Intoxication with ethyl alcohol (27.91%) was the most often cause of death in the group of mono-intoxications (Fig.2).
- In the mixed-intoxications the predominant group was DOA and medicine combination confirmed in 57.47% of death cases (Fig.3). Positive result for EA was found in 22% of the cases from the same group. Methadone and benzodiazepines were most often combination in this group (33%).

MONO-INTOXICATION	Male				Female			
	Mean age	SD	Min	Max	Mean age	SD	Min	Max
Ethyl alcohol (EA)	47.92	10.30	34	67	63.00	0.00	63	63
Carbon monoxide	60.50	15.95	40	78	66.25	15.13	55	88
Drugs of abuse (DOA)	33.40	3.85	30	38	/	/	/	/
Corrosives	56.50	14.52	33	74	56.75	14.06	39	69
Pesticides	34.67	24.09	7	51	26.50	12.02	18	35
Medicines	37.33	6.51	31	44	/	/	/	/
Total	46.13	14.97	7	78	55.00	19.33	18	88

Table 1. Mean age, standard deviation (SD), minimum (Min) and maximum (Max) age of males and females in each subcategory of mono-intoxication

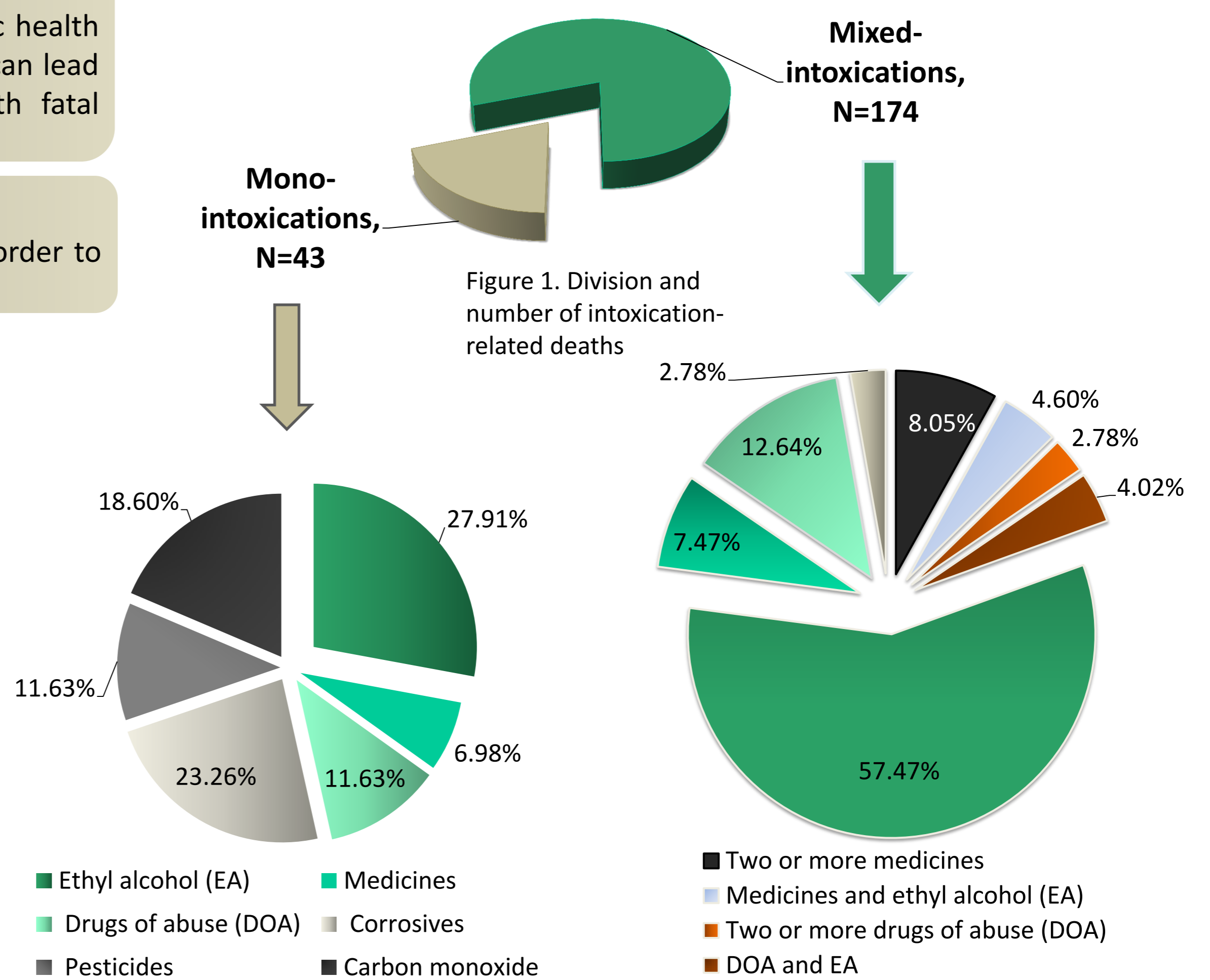


Figure 2. Classification of mono-intoxications and percentage of each group

Figure 3. Classification of mixed-intoxications and percentage of each group

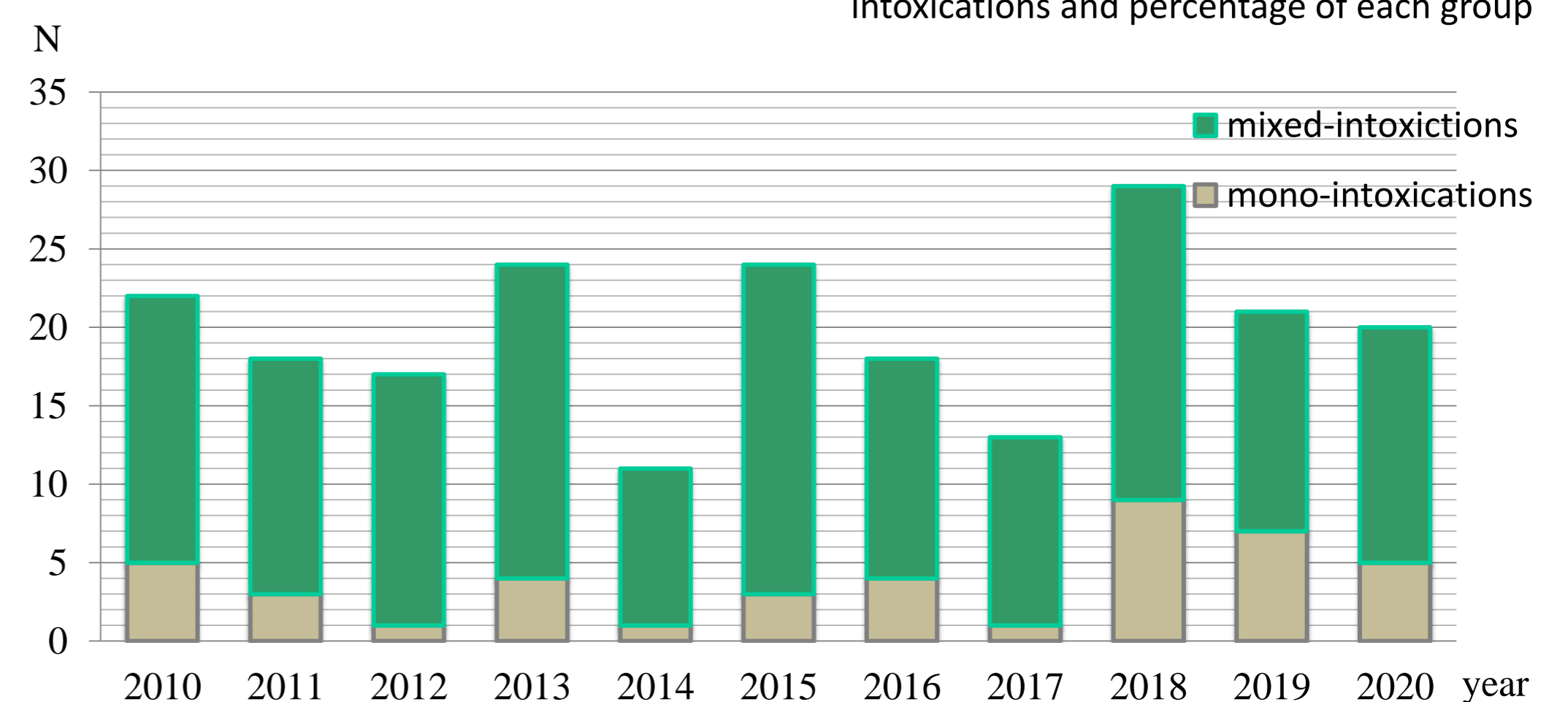


Figure 4. Number of mono- and mixed-intoxication cases from 2010 to 2020.

MIXED-INTOXICATION	Male				Female			
	Mean age	SD	Min	Max	Mean age	SD	Min	Max
Two or more medicines	45.13	12.15	29	66	46.00	27.93	14	83
Medicines and ethyl alcohol (EA)	39.83	15.29	21	57	53.00	16.97	41	65
Two or more drugs of abuse (DOA)	30.25	10.50	21	45	25.00	0.00	25	25
DOA and medicines with or without EA	33.72	10.18	16	72	32.23	5.53	22	41
DOA and EA	36.71	8.10	28	52	/	/	/	/
Corrosives and medicines/EA	51.75	14.59	36	80	60.80	15.25	38	78
Pesticides and medicines/EA	46.41	13.13	25	76	55.60	17.99	34	75
Carbon monoxide and EA	44.25	14.17	24	55	/	/	/	/
Total	37.64	12.52	16	80	44.00	19.02	14	83

Table 2. Mean age, standard deviation (SD), minimum (Min) and maximum (Max) age of males and females in each subcategory of mixed-intoxication

Conclusion

- In the long-term follow-up of the post-mortem toxicological analyses, it is observed that the number of mixed-intoxications is 4 times higher than intoxications caused by a single substance use.
- Mixed-intoxications are more frequent among youngsters.
- Being the most often used, methadone and benzodiazepines are a dangerous, even lethal combination. Knowing this it is important to draw attention to the control and regulations of prescription medicines and substitution treatment.