2023

SPOTLIGHT:
THE EMERGENCE OF XYLAZINE IN CANADA

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Health Canada's Drug Analysis Service (DAS) operates laboratories across Canada that analyze suspected illegal drugs seized by Canadian law enforcement agencies. These statistics are based on samples analyzed and may not be representative of all substances seized in Canada, nor of what drugs are circulating on the market. The data below represent the number of times a substance was identified in submitted samples. A single sample may contain more than one substance. Categorization of substances is based on the Controlled Drugs and Substances Act (CDSA).

The Emergence of Xylazine in Canada

January 2012 – December 2022

SUMMARY

- Since 2019, there has been an increase in the number of Xylazine identifications in samples submitted to the Drug Analysis Service (DAS) by Canadian law enforcement agencies.
- 93% of exhibits containing Xylazine were in powder form.
- In 2022, 75% of samples containing Xylazine were submitted by law enforcement agencies in Ontario.
- 79% of Xylazine samples contained two to four co-occurring substances. Fentanyl was the most frequent co-occurring psychoactive substance, occurring in 93% of samples.

CONTEXT

Xylazine was first identified in Canada in 2001 in exhibits submitted by law enforcement agencies, but it only started emerging in 2019 (Figure 1). Indeed, while there were five identifications of Xylazine in 2018, the number of Xylazine identifications increased to 205 in 2019. Between January 2012 and December 2022, Xylazine has been identified in 2,324 exhibits submitted for analysis to the Drug Analysis Service (DAS).

AIM

The aim of this spotlight report is to characterize trends in Xylazine identifications across Canada since 2012 and draw a more comprehensive picture of Xylazine in Canada based on exhibits seized and submitted to DAS for analysis by law enforcement agencies.

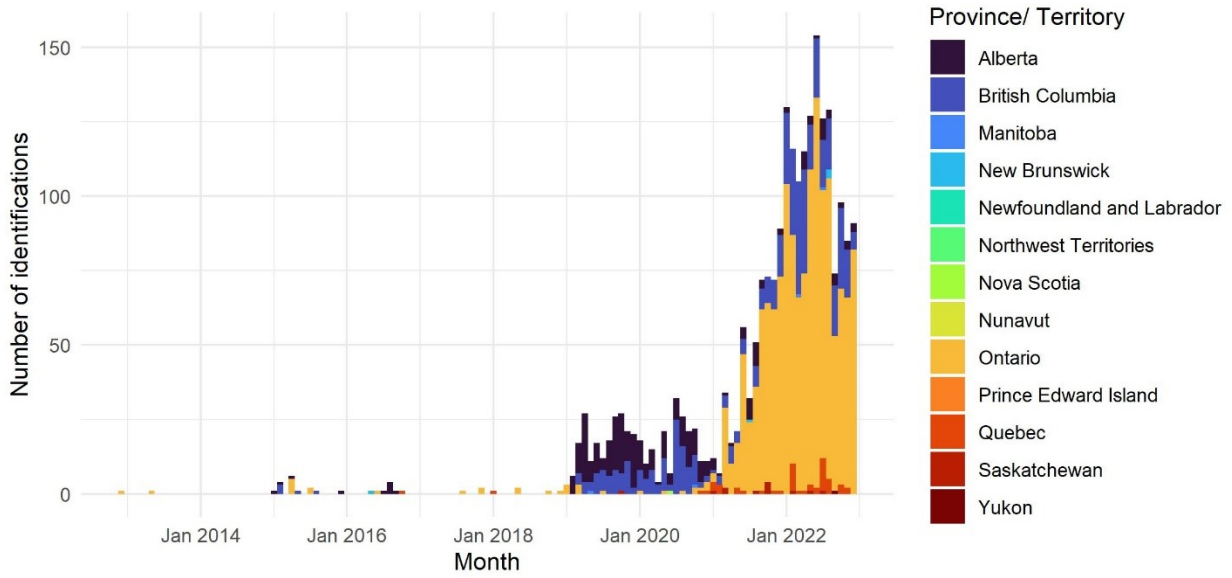

Figure 1. Xylazine identifications across time, per province or territory (2012 – 2022)

XYLAZINE OVERVIEW

- Xylazine is a non-narcotic analgesic drug that is used in veterinary medicine[1]. It is not currently approved for human use in Canada[2].
- Xylazine causes central nervous system depressant effects such as sedation, muscle relaxation, analgesia and anesthesia[3].
- Side effects of Xylazine include tiredness/faintness, respiratory depression, bradycardia, hypotension, hyperglycemia and miosis[1,3].
- Although Xylazine can potentially be used for its own effects, it is most frequently found, in exhibits submitted for analysis, in combination with other drugs. Indeed, Xylazine is likely used as an adulterant to increase bulk and enhance or mimic the effects of other illicit drugs[1,3].
- As of December 2022, Xylazine was not controlled in Canada under the *Controlled Drugs and Substances Act.*

DATA LIMITATIONS

This report is based on data made available by the Drug Analysis Service (DAS) which regularly analyses suspected illegal drugs seized by Canadian law enforcement agencies and samples submitted by public health partners. Some limitations govern the present data. First, law enforcement agencies submit samples for laboratory analysis based on investigation needs. Thus, analyzed samples may not be representative of substances circulating on the market as a number of factors may influence substances submitted by Canadian law enforcement agencies and reporting, such as increased awareness of substances and law enforcement capacities and priorities. Additionally, the DAS is only required to report substances that are controlled under the *Controlled Drugs and Substances Act*. As such, it is possible that not all noncontrolled substances (including Xylazine) were reported.

ANALYTICAL METHODS

Results of analyzed samples submitted by Canadian law enforcement agencies are reported in a centralized database, the Laboratory Information Management System (LIMS). The presented data were retrieved from the LIMS and covers the period between January 1, 2012 and December 31, 2022, inclusively. Xylazine identifications are defined as the identification of Xylazine in a unique exhibit.

The analysis of presented data was performed in R4.0.2. Data wrangling and visualization was performed using the *tidyverse* package[4]. Time trends were computed on a monthly basis and 3-month rolling averages are plotted in line plots.

Table 1. Xylazine identifications (count(n)) per province or territory (2012 – 2022)[*]

	Year											Total	
Province/ Territory	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Count (n)**	**Percent (%)**
Alberta	-	-	-	4	6	-	-	138	86	31	34	299	12.9
British Columbia	-	-	-	5	-	-	-	58	99	70	260	492	21.2
Manitoba	-	-	-	-	-	-	-	1	1	-	2	4	0.2
New Brunswick	-	-	-	-	1	-	-	-	-	1	3	5	0.2
Nova Scotia	-	-	-	-	-	-	-	-	1	-	-	1	0.0
Ontario	1	1	-	7	1	3	4	7	9	414	1,011	1,458	62.7
Quebec	-	-	-	-	1	-	1	-	2	12	36	52	2.2
Saskatchewan	-	-	-	-	-	-	-	1	-	8	3	12	0.5
Yukon	-	-	-	-	-	-	-	-	-	-	1	1	0.0
Total	**1**	**1**	**-**	**16**	**9**	**3**	**5**	**205**	**198**	**536**	**1,350**	**2,324**	**100.0**

GEOGRAPHICAL LOCATIONS

- In 2019-2020, a majority of the Xylazine identifications originated from samples submitted by law enforcement agencies in British Columbia and Alberta (Table 1).
- In 2021, a sharp increase of Xylazine identifications from samples submitted by law enforcement agencies in Ontario was observed, with a total of 414 identifications in 2021 and 1,011 in 2022 compared to 9 in 2020.
- In 2022, both British Columbia and Ontario observed an increase in the number of Xylazine identifications (Figure 1, Table 1).

PHYSICAL DESCRIPTION

- 93% of exhibits containing Xylazine were in powder form (Figure 2).

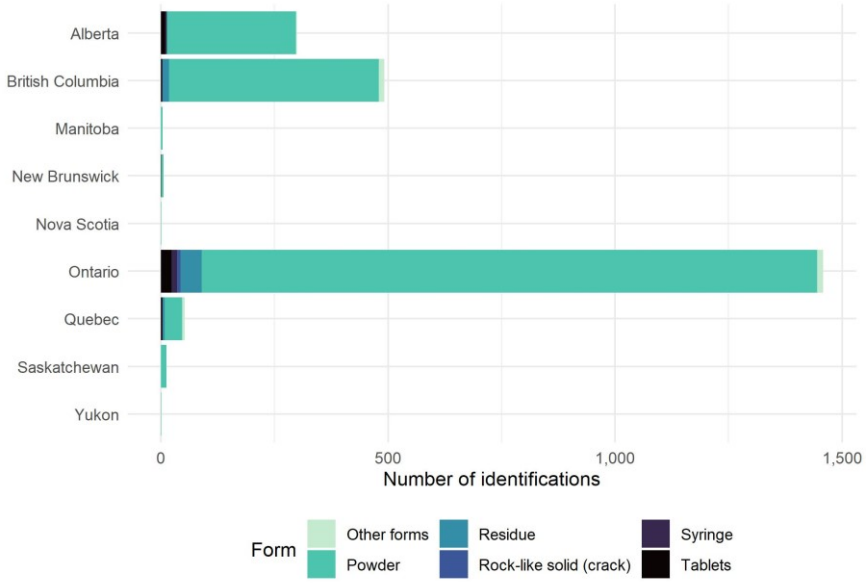

Figure 2. Form of exhibits containing Xylazine per province or territory (2012 – 2022)[*,†]

[*]Xylazine has not yet been identified in samples originating from certain provinces or territories.
[†]Due to the low number of Xylazine identifications from some provinces, the available data on form may not be an accurate representation of circulating Xylazine in a given province or territory.

Co-occurring Substances

- 79% of exhibits containing Xylazine contained two to four other substances (Table 2).
- While in 2019-2020, 81% of Xylazine samples were found with two or fewer other substances, in 2021-2022, 82% of Xylazine samples contained at least three other co-occurring substances (Figure 3).
- Since 2019, Xylazine was most frequently found with opioids and cutting agents (Figure 4).
- As of 2021, Xylazine was also found in combination with sedative/hypnotics, although this trend appears to have peaked in early 2022 (Figure 4).

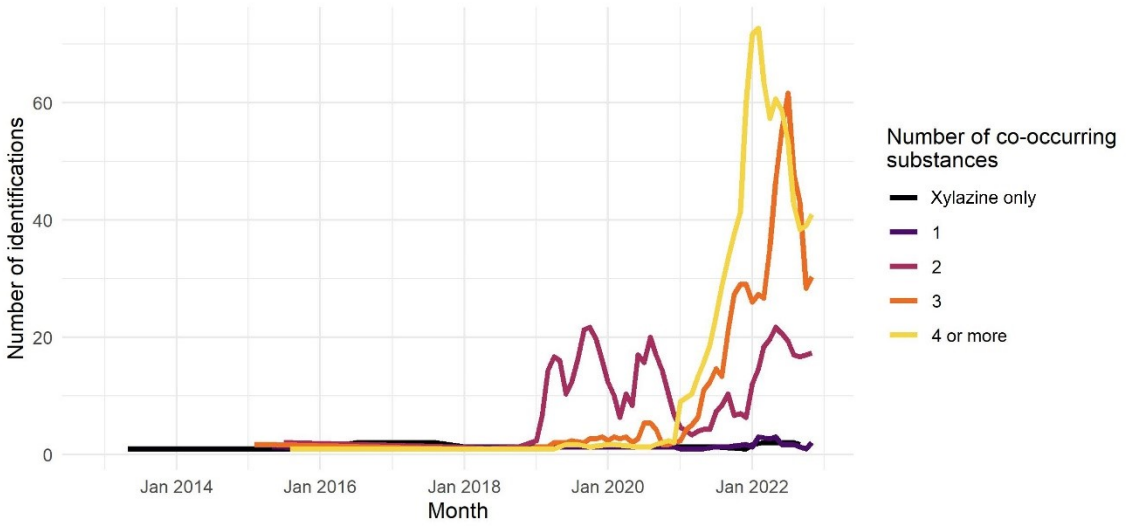

Figure 3. Number of co-occurring substances with Xylazine, 3-month rolling average (2012 – 2022)

Table 2. Xylazine identifications per number of co-occurring substances (2012 –2022)

Number of co-occurring substances	Count (n)	Percent (%)
Xylazine only	23	1.0
1	36	1.5
2	613	26.4
3	694	29.9
4	530	22.8
5	220	9.5
6	121	5.2
7	56	2.4
8	18	0.8
9	9	0.4
10	3	0.1
11	1	0.0

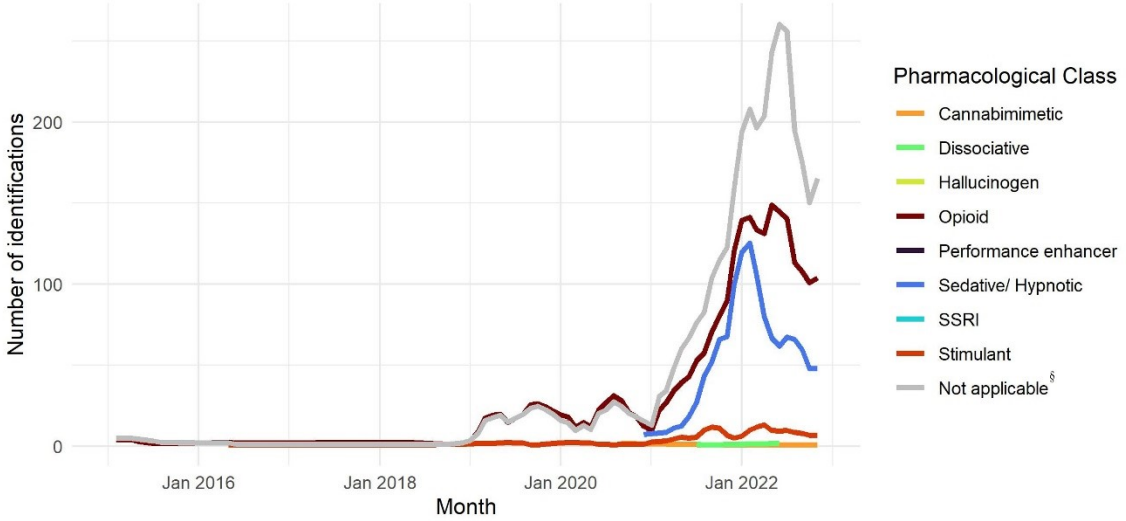

Figure 4. Number of Xylazine co-occurrences by pharmacological class, 3-month rolling average (2012 – 2022)

§ Includes cutting agents, precursors/key intermediates/reagents, prescription drugs, over the counter drugs and non-drugs.

CO-OCCURRING SUBSTANCES (CONTINUED)

- Frequently co-occurring substances include Caffeine (cutting agent, 97%), Fentanyl (opioid, 93%), Dimethylsulphone (cutting agent, 38%) and Flualprazolam (sedative/ hypnotic, 28%) (Figure 5, Table 3).
- Previous reports suggest that the combined use of Xylazine and an opioid such as Fentanyl or a benzodiazepine-related drug such as Flualprazolam may increase the risk of overdose fatality[1,3].

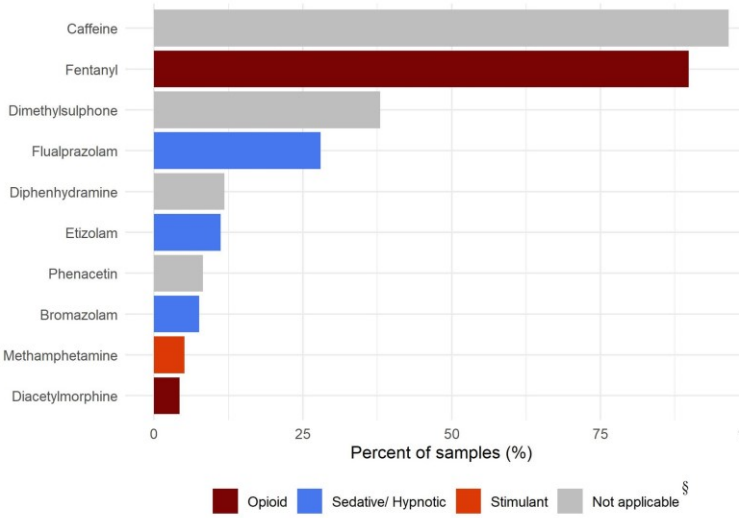

Figure 5. Top 10 co-occurring substances with Xylazine (2012 – 2022)

Table 3. Top 20 co-occurring substances with Xylazine (2012 –2022)

Name	Chemical Class	Pharmacological Class	Count (n)	Percent (%)
Caffeine	Cutting Agent	*Not applicable*[§]	2,243	96.5
Fentanyl	Fentanyl (Sub) Class	Opioid	2,150	92.5
Dimethylsulphone	Cutting Agent	*Not applicable*	884	38.0
Flualprazolam	Benzodiazepine (BZD) Class	Sedative/Hypnotic	651	28.0
Diphenhydramine	Cutting Agent	*Not applicable*	274	11.8
Etizolam	Benzodiazepine (BZD) Class	Sedative/Hypnotic	260	11.2
Phenacetin	Cutting Agent	*Not applicable*	190	8.2
Bromazolam	Benzodiazepine (BZD) Class	Sedative/Hypnotic	177	7.6
Methamphetamine	Amphetamine / Methamphetamine (Sub) Class	Stimulant	118	5.1
Diacetylmorphine	Opiate Class	Opioid	100	4.3
Flubromazepam	Benzodiazepine (BZD) Class	Sedative/Hypnotic	89	3.8
Cocaine	Tropane (Cocaine) Class	Stimulant	84	3.6
Isotonitazene	Opioid Class (Non-Fentanyl, Non-Opiates)	Opioid	57	2.5
Flubromazolam	Benzodiazepine (BZD) Class	Sedative/Hypnotic	55	2.4
Melatonin	Cutting Agent	*Not applicable*	53	2.3
para-Fluorofentanyl	Fentanyl (Sub) Class	Opioid	53	2.3
Carfentanil	Fentanyl (Sub) Class	Opioid	52	2.2
Furanyl UF-17	Opioid Class (Non-Fentanyl, Non-Opiates)	Opioid	50	2.2
Narcotine	Cutting Agent	*Not applicable*	35	1.5
Desalkylgidazepam	Benzodiazepine (BZD) Class	Sedative/Hypnotic	31	1.3

[§] Includes cutting agents, precursors/key intermediates/reagents, prescription drugs, over the counter drugs and non-drugs.

Conclusion

In summary, there was an observed increased of the number of identifications of Xylazine since 2019 in Canada in samples submitted by Canadian law enforcement agencies. Xylazine samples were most often submitted by law enforcement agencies from Ontario, Alberta and British Columbia. Ninety-three percent (93%) of exhibits containing Xylazine were in powder form and 97% contained at least two co-occurring substances. Psychoactive co-occurring substances with Xylazine included Fentanyl (opioid) which was found in 93% of Xylazine samples and Flualprazolam (sedative/hypnotic), found in 28% of Xylazine samples. Previous studies report that Xylazine can induce central nervous system depression, respiratory depression, bradycardia and hypotension in humans[3]. As such, synergistic effects may occur when Xylazine is consumed concurrently with substances producing similar effects such as opioids and sedative/hypnotics and may increase overdose leading to fatality[1,3]. Continued monitoring is required to ensure partners are aware of the concomitant presence of Xylazine in the illicit drug supply in Canada.

References

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For more information, please contact Health Canada's Drug Analysis Service

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