Self-reported Xylazine Experiences: A Mixed-methods Study of Reddit Subscribers

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Objectives: Xylazine is an α_2-agonist increasingly prevalent in the illicit drug supply. Our objectives were to curate information about xylazine through social media from people who use drugs (PWUDs). Specifically, we sought to answer the following: (1) What are the demographics of Reddit subscribers reporting exposure to xylazine? (2) Is xylazine a desired additive? And (3) what adverse effects of xylazine are PWUDs experiencing?

Methods: Natural language processing (NLP) was used to identify mentions of "xylazine" from posts by Reddit subscribers who also posted on drug-related subreddits. Posts were qualitatively evaluated for xylazine-related themes. A survey was developed to gather additional information about the Reddit subscribers. This survey was posted on subreddits that were identified by NLP to contain xylazine-related discussions from March 2022 to October 2022.

Results: Seventy-six posts were extracted via NLP from 765,616 posts by 16,131 Reddit subscribers (January 2018 to August 2021). People on Reddit described xylazine as an unwanted adulterant in their opioid supply. Sixty-one participants completed the survey. Of those who disclosed their location, 25 of 50 participants (50%) reported locations in the Northeastern United States. The most common route of xylazine use was intranasal use (57%). Thirty-one of 59 (53%) reported experiencing xylazine withdrawal. Frequent adverse events reported were prolonged sedation (81%) and increased skin wounds (43%).

Conclusions: Among respondents on these Reddit forums, xylazine seems to be an unwanted adulterant. People who use drugs may be experiencing adverse effects such as prolonged sedation and xylazine withdrawal. This seemed to be more common in the Northeast.

Keywords: fentanyl, natural language processing, toxicosurveillance, xylazine

Xylazine is an α_2-agonist used in veterinary medicine.[1] Its chemical structure resembles clonidine, primarily causing sedative effects.[1] Until recently, descriptions of exposures to xylazine were limited to case reports of intentional exposures.[1]

Emerging evidence demonstrates that xylazine is increasingly found in the opioid drug supply in the Northeast and is spreading.[2–4] In Philadelphia, xylazine is found in 75% to 90% of drug samples.[4,5] Few studies have described the experience of concurrent xylazine use with opioids among people who use drugs (PWUDs).[3]

Reddit is a popular social network, and because of anonymity on the site, Reddit has become a hub for the open discussion of stigmatized topics including drug use.[6] Our objectives were to better understand xylazine use by surveying PWUDs on Reddit.[4]

METHODS

This is a mixed-methods study of PWUDs who use Reddit. Study methods include natural language processing (NLP) to identify posts on Reddit related to xylazine use for qualitative analysis, as well as posting a survey to Reddit for quantitative analysis.

Qualitative Analysis of Existing Posts

Several drug-related subreddits on Reddit were selected based on study group consensus.[6] From the chosen subreddits, we collected all available retrievable posts via the PRAW Python application programming interface for Reddit.[6] We searched for mentions of "xylazine" and "tranq," as well as lexical variants, using NLP to identify posts on December 10, 2021.[6] Two authors (K.O., A.S.) reviewed a sample of posts to identify relevant categories into which the posts could be coded. We used a thematic

content analysis to classify posts into different codes.[7] A consensus approach was used to assign codes to the posts.[7]

Survey Design

An anonymous English-language survey was developed to include questions about demographics and experiences with xylazine. The survey was created on Qualtrics (Qualtrics XM, Provo, UT), which allowed for web-based distribution via a link. All respondents gave informed consent before beginning the survey. The survey included 18 questions with no financial incentive (Supplement S1, http://links.lww.com/JAM/A439). Incomplete responses for individual questions were not included in the denominator of the analysis. Surveys that were opened but not completed were excluded. The survey was posted 17 times on 7 subreddits from March to August 2022 by a member of our research team (A.S.), who identified himself and the goal of the study on all posts and obtained consent from the moderators (Supplement S2, http://links.lww.com/JAM/A439). The subreddits where the survey was posted were identified through the qualitative analysis as having the highest number of posts about xylazine.[8] Additional drug-related subreddits with large numbers of subscribers were also identified as locations to post the survey. Only subreddits where the moderators allowed the posting of the survey were included. The survey link was posted after the qualitative data had been gathered so as to not influence the content of posts in the qualitative analysis.

This study was approved by Emory Institutional Review Board.

RESULTS

NLP Results

Fifteen subreddits were found to contain at least 1 possible reference to xylazine (Supplement S3, http://links.lww.com/JAM/A439), and 76 posts were identified in total. Possible misspellings of xylazine were also generated via a validated NLP tool before conducting the search.[9] Fourteen posts were excluded for (1) not mentioning xylazine or (2) discussing a veterinary use of xylazine. Major themes identified included discussion of other drugs used with xylazine, methods of using xylazine, and geography of xylazine use. In addition, posts that discussed dependence on or addiction to xylazine and other drugs were identified to further understand the patterns of xylazine use as well as to explore the impact xylazine might have on medications for opioid use disorders. Table 1 includes major themes with example quotes and counts of times major themes appeared.

Survey Results

The survey link was posted on the following subreddits: *r*/opiates, *r*/fentanyl, *r*/DrugNerds, *r*/ObscureDrugs, *r*/research chemicals, *r*/heroin, *r*/suboxone. Sixty-one participants completed the survey. Survey participant demographics are outlined in Table 2. The median age range reported by participants was 30 to 39 years old. The majority were male (67%), White non-Hispanic (79%), and from the Northeast United States (50%).

Participants were asked about drug use history (Table 2). A majority of participants (74%) report that they do not seek out xylazine. Most participants used multiple other drugs, with fentanyl being the most common opioid (80%). Many participants used multiple methods of intake, with intranasal (57%) and injection (43%) being the most common. Both participants who reported either intranasal or injection use reported the development of skin wounds.

Participants reported adverse effects from using xylazine (Table 2). A majority of participants (53%) reported having withdrawal from using xylazine. A majority (57%) of patients reported that their xylazine use has made withdrawing from other substances worse. The participants emphasized these experiences

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TABLE 1. Major Themes From Reddit Posts About Xylazine

Theme	Definition	Example Quotes	Theme Frequency (% of Posts Theme Appeared in) (n = 62)
Other drugs used with xylazine	Posts that discussed xylazine use with other specific drugs	"Around me it's usually fetty/etonitazene analogs mixed with Xylazine which is an animal tranq similar chemically to clonidine, and sometimes ketamine is thrown in too alongside synthetic cannabinoids"	53%
Sentiment about xylazine	Posts that described a positive or negative experience about using xylazine	"I fucking LOVED xylazine… I loved it. I was so upset if my fetty wasn't cut with it."	24%
Method of xylazine use	Posts that described how xylazine was used	"Always break the tiniest crumb off to test new batches. Smoking helps cause it hits pretty fast so you can judge"	6%
Geographic use	Posts that described a geographic area	"It's called xylazine… Philly's got that 'tranq dope…' puts you out but you get addicted to that along with the fent!"	37%
Dependence on xylazine and other substances	Posts that discuss dependence, addiction, or withdrawal to xylazine and other substances	"12 hours later from my last shot of this fent/trank/ketamine/xylazine shit I started going thrpigh the worst withdraws ever. Drank another 115 methadone and within 15 minutes threw it up everywhere. Withdraw is ridiculous and methadone doesn't fucking cut it"	11%
Use of medications for opioid use disorder (MOUDs)	Posts that discuss buprenorphine, methadone, naltrexone, or other MOUDs	"I'm on 80 mg of methadone… we started getting weekly take home bottles from this COVID shit do I would get a few bags here or there. Thinking ahh I got the methadone to fall back on and I'll be fine… well come to find out the shit is heavily cut with xylazine"	2%

TABLE 2. Survey Results: Demographics, Patterns of Drug Use, and Experiences with Xylazine

Demographics

Age Range (n = 51)		Gender (n = 51)		Race (n = 50)		Geography (n = 50)	
<20 y	8%	Male	67%	White, non-Hispanic	79%	Northeast*	50%
20–29 y	33%	Female	29%	White, Hispanic	4%	Southeast	14%
30–39 y	47%	Nonbinary/other	4%	African American	4%	Midwest	14%
40–49 y	12%			Asian	5%	Southwest	0%
≥50 y	0%			American Indian	4%	West	10%
				Native Hawaiian/Pacific Islander	4%	Other country†	12%

Patterns of Drug Use

Intentionally Seek Out to Buy Drugs That Contain Xylazine (n = 61)		Drug Use on a Typical Day (n = 60)		Method of Xylazine Exposure (n = 61)		Frequency of Xylazine Use (n = 61)	
Yes	26%	Any opioids	93%	Inhalational (smoking)	20%	Daily	39%
No	74%	Fentanyl	80%	Intranasal (snorting)	57%	1–6 times per week	19%
		Cannabis	45%	Injection	43%	1–4 times per month	15%
		Stimulants	41%	Oral	3%	A few times per year/rarely	27%
		Benzodiazepines	21%				
		Hallucinogens	10%				

Experiences With Xylazine

Adverse Effects From Xylazine Use (n = 48)		Have You Experienced Withdrawal From Xylazine? (n = 59)		What Xylazine Withdrawal Symptoms Have You Experienced? (n = 35)		How Has Withdrawing From Other Drugs Changed Since You Started Using Xylazine? (n = 51)	
Increased overdoses/passing out	81%	Yes	53%	Body aches	63%	Worse	57%
Skin wounds or infections	43%	No	47%	Cravings	49%	The same	39%
Increased emergency room visits	17%			Anxiety	91%	Better	4%
				Depressed Mood	74%		

*Of the 25 responses that were included from a state in the Northeast, 12 responses were from Pennsylvania.
†Included 2 responses from the United Kingdom, 2 responses from Canada, 1 response from Sweden, and 1 response from Ecuador.

in a free-response question (Supplement S4, http://links.lww.com/JAM/A439).

DISCUSSION

Our study found that most of the participants did not seek out xylazine, were primarily from the northeastern United States, and reported wounds and worsened withdrawal symptoms. Past studies have reported xylazine to be an undesired adulterant in the drug supply.[3] However, some of the participants in this study reported they sought out xylazine, perhaps to avoid withdrawal. In our qualitative analysis of posts, we found a small number of participants reported positive sentiments toward xylazine.

Most participants reported concerning adverse effects of xylazine use, such as sedation.[1] Similar to other works, our study found high rates of concurrent opioid use with xylazine.[10,11] Some participants also reported an additional association of increased skin wounds with xylazine use, regardless of intravenous or intranasal use, which adds to other studies that have reported this finding.[1–3]

This study corroborates the findings from other studies that xylazine use is concentrated in the northeastern United States.[3] A majority of our participants reported that they were from the Northeast.[3,11] A majority of participants in our study were younger (30–39 years old), non-Hispanic White, and male, which may reflect the demographics of people who use Reddit.[6,12] Continued research is needed to assess the burden of xylazine use among different demographic groups.[11]

People who use drugs reported worse withdrawal symptoms from other drugs after they had initiated xylazine, and ongoing withdrawal symptoms can lead to discontinuation of or further challenges to initiation of medications for opioid use disorder.[5] The optimal management of xylazine withdrawal is unknown.[1,10,13]

This study also demonstrates the opportunity to recruit participants from Reddit. Although there are studies that use NLP to analyze Reddit posts, there are few studies that use Reddit for recruitment.[14] There are several practices for improving studies using Reddit, including discussing the subreddits used to find posts, keyword identification, and following the rules of subreddits.[8,12] Given the anonymity of Reddit, it could be a valuable source to survey questions about sensitive topics.[6] Additional social media sites could be included in future studies to expand the participant base.[15] As new substances emerge in the drug market, Reddit could be a resource to study these substances with the goal of informing public health.

There are several limitations to this small study. The demographics of people who use Reddit may not be representative of the population of PWUDs, limiting the generalizability.[6,12] People who use drugs may have limited access to social media sites.[8]

CONCLUSIONS

Among this small sample of people on Reddit, xylazine seems to be an unwanted adulterant, common in the Northeast, with reported adverse effects such as skin wounds and worsening withdrawal from other substances.

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