

# Kratom: What do we know about its use, safety, and overdose risk?



*Mandy Sladky, MSN, RN, CARN and Caleb Banta-Green, PhD, MPH, MSW*

## Key Points

- Data and reports from local health care professionals suggest kratom use is relatively low in Washington State, with some cases of kratom dependency.
- Kratom offers potential benefits to relieve pain, improve mood, ease opioid withdrawal, and manage symptoms of other substance use disorders. But its effects and safety profile are not fully understood.
- The number of overdose deaths involving kratom in WA State has increased but remain low. Most of these deaths involve other substances as well.
- Kratom and kratom-containing products have not been approved by the Food and Drug Administration. More research is needed to evaluate its safety and efficacy.

## Introduction

Kratom is a psychoactive substance made from the leaves of the *Mitragyna speciosa* tree, native to Southeast Asia. Use and impacts of kratom are not well understood. Advertisements at gas stations are common, and there are occasional media reports of its involvement in deaths, leading to questions like: *What is kratom? Why do people use it? Is it dangerous? Can you be addicted to kratom?* We answer these common questions below.

## Background

Kratom is reported to be used, and sometimes advertised, for its potential to relieve pain, increase energy, improve mood, and alleviate opioid withdrawal (opioids include substances such as morphine, oxycodone, heroin, and fentanyl). Kratom's components tend to produce stimulant-like effects at lower doses and depressant effects at higher doses.<sup>1</sup> The primary compounds in kratom, mitragynine and 7-hydroxymitragynine, partially activate opioid receptors to relieve pain and induce mild euphoria. These compounds act on several neurotransmitter systems, suggesting potential antidepressant, anxiety-relieving, and antipsychotic effects.<sup>1</sup>

While there are potential therapeutic benefits of kratom, there are also safety concerns. More research is needed to better understand kratom's effects, which may vary greatly depending on the amount taken, how it's processed, and varying quality and consistency of products.<sup>2</sup> Kratom is typically sold as dried leaves, commonly brewed into tea, or in capsules. It is more recently available as extracts or edibles, which may be considerably more potent.<sup>2</sup> High potency kratom and polysubstance use with kratom have been linked to deaths.

Kratom is not currently federally scheduled, but it has been banned in some states and local municipalities. It is widely available and commonly sold online and at gas stations and in some bars. The Food and Drug Administration (FDA) has

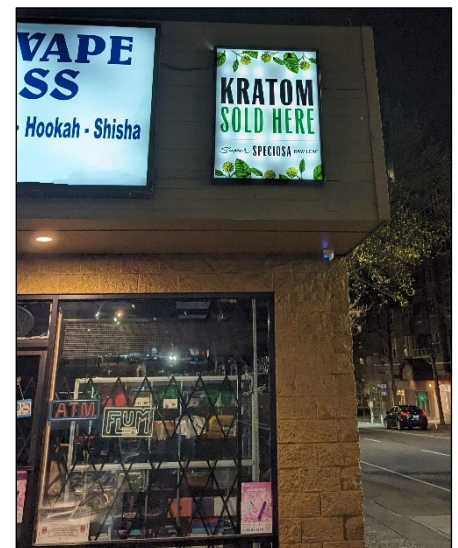


Photo credit: Caleb Banta-Green.

not approved kratom or any kratom-containing products and warns against its use since it has not been fully evaluated for safety and efficacy.<sup>3</sup>

## Common questions about kratom

### How common is kratom use?

The number of people using kratom in the United States is difficult to determine. National surveys likely underestimate its use, with studies suggesting that 1-6 million Americans have tried kratom at some point. The American Kratom Association estimates significantly higher numbers, with 10-15 million people in the U.S. having tried kratom and about 5 million current regular users.<sup>2</sup> Evidence suggests kratom is most often used by current and former opioid users to manage pain, opioid withdrawal, and opioid cravings.<sup>4</sup>

### How often do people in treatment for opioid use disorder report using kratom? How do they do in treatment?

Local data from Washington State's opioid treatment programs (OTPs) suggest kratom is rarely reported by clients as their primary substance of use; only four patients statewide among 15,080 individuals in care have reported kratom as their primary substance used upon entering treatment (*Personal communication, Sara Multanen-Karr, Washington State Health Care Authority, February 1, 2024*). However, improved data collection methods are needed to better understand local rates of use and use disorder.

Washington State health care and substance use disorder (SUD) treatment providers report low prevalence of kratom use among their patients, although most settings do not commonly or systematically screen for kratom. Consistent with existing research, these providers from across WA State find that patients typically use kratom to manage opioid withdrawal symptoms but then find that they become dependent on kratom as well. Health care providers report that the medications for opioid use disorder (OUD), methadone and buprenorphine, have worked well with people with OUD who are physically dependent on kratom.

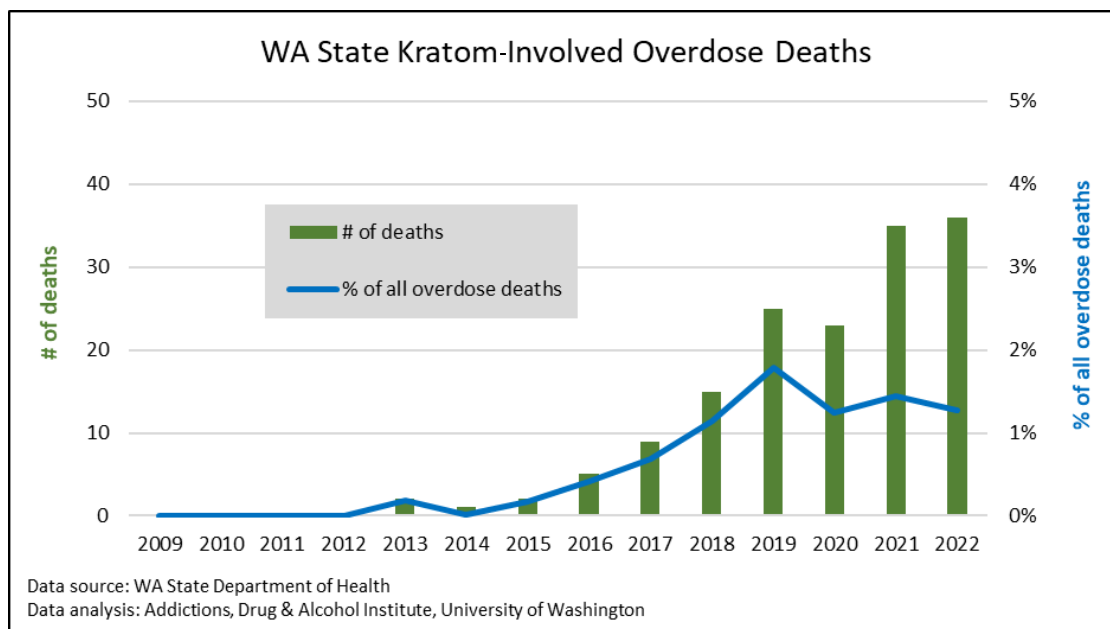
*We have two patients who were using heroin and then switched to exclusively using kratom for the next two years. It kept them from going into opioid withdrawal[,] so they were able to successfully get off heroin. They would feel withdrawal symptoms, however, if they didn't use the kratom for several days and came to us because they were afraid that if kratom ever became banned by the FDA, they would return to heroin (or now fentanyl). We placed them on Suboxone [a brand name for oral buprenorphine] as they dropped the kratom, and just recently they switched to Sublocade [a brand name for long-acting injectable buprenorphine]. They are doing fantastic. – Physician*

*I have treated one patient for kratom dependence. They started opioids with oxycodone pills, did not like being hooked on that and found kratom kept withdrawal away...until they tried to stop that as well. [They] came to our clinic [and] did well on... [buprenorphine]. For a few years after that I would specifically ask about kratom use, including a question on our preliminary assessment form. No one else endorsed using [kratom]. I have since stopped asking. –Physician*

*We have been testing for kratom but rarely see it... I think it's a group that is used to 'harder' drugs and kratom just doesn't clear the bar. We have had 3-4 people come to us for medications for OUD for kratom dependence and have had fine outcomes with both buprenorphine and methadone. [In] my inpatient work we frequently see kratom dependence as a secondary problem to other use disorders and maybe one primary kratom dependence case in [about] 2 years. – Physician and OTP medical director*

## How often is kratom involved in overdose deaths?

The figure below shows the number of overdose deaths (also known technically as “poisoning”) in Washington State in which kratom was detected. Since 2013, when the first two deaths involving kratom were reported, the number of deaths has increased to 36 in 2022 (the last year with complete data). The percent of all overdose deaths in which kratom was detected has been very low overall and only 1% in 2022. In comparison, in 2022 there were 1,857 overdose deaths in WA State involving “other synthetic opioids,” predominantly non-pharmaceutical fentanyl, representing 65% of all overdose deaths.<sup>5</sup>



Most drug overdoses involve multiple drugs. However, because of inconsistent coding of kratom in multiple drug categories, it is not possible to use International Classification of Diseases (ICD) coding to analyze death certificate data to identify all of the substances detected in a death. Therefore, to explore the presence of other drugs in kratom-involved overdose deaths, ADAI staff manually analyzed the “cause of death” text field from death certificate data for deaths in which kratom/mitragynine was reported in WA State for 2022. These data indicated that **among the 36 kratom-involved deaths in 2022:**

- 89% (n=33) involved at least one other drug,
- 80% (n=29) involved at least one opioid,
- 72% (n=26) involved fentanyl with or without other substances.

For comparison, among 2,746 deaths in WA State in 2021 and 2022 that involved “other synthetic opioids” (mostly non-pharmaceutical fentanyl) and in which heroin was not present, 32% had no other drug detected.<sup>6</sup> That is, there were many more deaths involving fentanyl than kratom, and a much larger proportion of fentanyl deaths involved no other drug, suggesting kratom is a much less lethal substance.

Furthermore, a detailed analysis of kratom-involved deaths in Florida was conducted by the *Tampa Bay Times*. They analyzed data from 2013, when the first kratom-involved death was detected, through June 30, 2022. A minority of cases, 8%, involved kratom without any other substances present.<sup>7</sup> Parallels with Washington State data include that 2013 was the same year that a kratom-involved death was detected in both states, and both states report similar, low proportions of deaths involving just kratom.

## Evidence on risks and benefits

Research on kratom, especially in the U.S., is limited, with most data coming from case studies and observation. Currently, there is not enough information on kratom to report more definitively on its impact on health and well-being. The National Institute on Drug Abuse (NIDA) notes on their webpage that *“NIDA supports and conducts research to evaluate potential medicinal uses for kratom and related chemical compounds...NIDA also supports research towards better understanding the health and safety effects of kratom use. Rare but serious effects have been reported in people who use kratom.”*<sup>8</sup>

Evidence suggests that kratom may be effective as an analgesic and may decrease the use of other drugs.<sup>9</sup> People who use kratom long-term report benefit in managing SUD symptoms (e.g., reducing cravings and use of other substances) and relief from withdrawal symptoms for alcohol, opioids, and other drugs.<sup>9</sup> Results of preclinical studies in animals also strongly suggest that kratom/mitragynine is useful for alleviating pain and opioid withdrawal and has a lower risk of central nervous system effects and respiratory depression than conventional opioids.<sup>1,10</sup> People who use kratom daily have also reported improvements in daily living and productivity, including reduced pain, improved mood, increased energy, and alertness. Euphoria or feeling “high” is less frequently reported.<sup>11</sup>

The most commonly reported side effects of kratom are typically mild and include agitation, irritability, tachycardia (high heart rate), nausea, drowsiness, vomiting, confusion, and hypertension. Adverse effects also include reduced appetite and anorexia, transient erectile dysfunction, difficulty sleeping, sweating, darkening patches of skin, hair thinning, shaking, and constipation. Higher doses of kratom and concentrated products are riskier. Using kratom with other substances can enhance the effects of those substances, which may increase negative effects like respiratory depression.<sup>1,12</sup> Although rare, kratom has been linked to serious health issues, including seizures, liver toxicity, and irregular heart arrhythmias. Furthermore, kratom’s unregulated status as a dietary supplement warrant concern for contamination, mislabeling, and varying quality and consistency, circumstances which have led to serious illness and death.<sup>1,8,12,13</sup>

People who use kratom frequently can develop tolerance, dependence, and cravings, suggesting the potential for kratom use disorder. However, most users do not report social or functional impairment, a necessary component of a substance use disorder diagnosis.<sup>11,14</sup> People who use kratom are more likely to have more severe symptoms of SUD related to other substances, but this does not imply that kratom *causes* this. Instead, it may be that people with severe SUD are more likely to use kratom, and thus are trying to stop the use of another, often illicit, substance.<sup>15,16</sup> A small study showed regular kratom use did not significantly alter health measures, including blood chemistry, organ function, and vital signs of users over time.<sup>17</sup>

## Recommendations

More information is needed to better understand kratom’s impact. We make the following recommendations based on what is currently known:

- Individuals should carefully weigh the risks before deciding to use kratom and consider other approaches to manage emotional or physical pain, SUD, and opioid withdrawal. Buprenorphine and methadone are highly effective in treating opioid use disorder, and access is expanding rapidly in WA State.
- Health care providers and SUD treatment providers should be aware of kratom's popularity and potential effects, risks, and medication interactions. Recent reviews of the clinical pharmacology of kratom are available.<sup>18</sup> Ask patients about all substances they use, including kratom, in a supportive and non-judgmental way to encourage open conversations. Talk with patients about how kratom may, or may not, fit into their recovery and/or harm reduction goals and strategies.
- Kratom offers potential benefits to relieve pain, improve mood, and manage SUD symptoms, but its effects and safety profile are not fully understood. Reports from Washington State data and local health care professionals

suggest kratom use is relatively low and primarily for managing opioid withdrawal symptoms. Some cases of kratom dependency have been observed. The number of overdose deaths involving kratom has increased but remain low and rarely involve only kratom. Despite its therapeutic potential, concerns about safety call for a cautious approach.

## References

1. Hartley, C., Bulloch, M., & Penzak, S. R. (2022). Clinical Pharmacology of the Dietary Supplement Kratom (*Mitragyna speciosa*). *Journal of Clinical Pharmacology*, 62(5), 577–593. <https://doi.org/10.1002/jcph.2001>
2. Smith, K. (2022). Dr. Kirsten Smith - Kratom. In *The Addiction Psychologist*. <https://podcasts.apple.com/mx/podcast/dr-kirsten-smith-kratom/id1517074983?i=1000565426508>
3. U.S. Food and Drug Administration. (2024, January 16). FDA and kratom. <https://www.fda.gov/news-events/public-health-focus/fda-and-kratom>
4. Henningfield, J. E., Grundmann, O., Garcia-Romeu, A., & Swogger, M. T. (2022). We need better estimates of kratom use prevalence. *American Journal of Preventive Medicine*, 62(1), 132-133. <https://doi.org/10.1016/j.amepre.2021.07.022>
5. Addictions, Drug & Alcohol Institute, University of Washington. (n.d.). Drug-caused deaths across Washington State. [https://adai.uw.edu/wadata/major\\_drug\\_deaths.htm](https://adai.uw.edu/wadata/major_drug_deaths.htm)
6. Addictions, Drug & Alcohol Institute, University of Washington. (n.d.). Heroin and fentanyl in Washington state [https://adai.uw.edu/wadata/heroin\\_versus\\_fentanyl.htm](https://adai.uw.edu/wadata/heroin_versus_fentanyl.htm)
7. How the Tampa Bay Times investigated the kratom industry. (2023, Dec. 7). *Tampa Bay Times*. <https://www.tampabay.com/investigations/2023/12/07/deadly-dose-kratom-industry-tampa-bay-times-investigation/>
8. National Institute on Drug Abuse. (n.d.). Kratom. <https://nida.nih.gov/research-topics/kratom#legal>
9. Preverte, E., Kuypers, K. P. C., Theunissen, E. L., Esposito, G., Ramaekers, J. G., Pasquini, M., & Corazza, O. (2023). Clinical implications of kratom (*Mitragyna speciosa*) use: a literature review. *Current Addiction Reports*, 10(2), 317–334. <https://doi.org/10.1007/s40429-023-00478-3>
10. Prozialeck, W. C., Avery, B. A., Boyer, E. W., Grundmann, O., Henningfield, J. E., Kruegel, A. C., McMahon, L. R., McCurdy, C. R., Swogger, M. T., Veltri, C. A., & Singh, D. (2019). Kratom policy: The challenge of balancing therapeutic potential with public safety. *International Journal on Drug Policy*, 70, 70–77. <https://doi.org/10.1016/j.drugpo.2019.05.003>
11. Smith, K. E., Panlilio, L. V., Feldman, J. D., Grundmann, O., Dunn, K. E., McCurdy, C. R., Garcia-Romeu, A., & Epstein, D. H. (2024). Ecological momentary assessment of self-reported kratom use, effects, and motivations among US adults. *JAMA Network Open*, 7(1), e2353401. <https://doi.org/10.1001/jamanetworkopen.2023.53401>
12. Haden, P. (2023, July 8). Herbal supplement kratom targeted by lawsuits after a string of deaths. *NPR*. <https://www.npr.org/2023/07/08/1186514144/kratom-herbal-supplement-lawsuits-deaths-fda>
13. Krantz, M. J., Rudo, T. J., Haigney, M. C. P., Stockbridge, N., Kleiman, R. B., Klein, M., & Kao, D. P. (2023). Ventricular arrhythmias associated with over-the-counter and recreational opioids. *Journal of the American College of Cardiology*, 81(23), 2258-2268. <https://doi.org/10.1016/j.jacc.2023.04.009>
14. Smith, K. E., Dunn, K. E., Rogers, J. M., Garcia-Romeu, A., Strickland, J. C., & Epstein, D. H. (2022). Assessment of kratom use disorder and withdrawal among an online sample of US adults. *Journal of Addiction Medicine*, 16(6), 666–670. <https://doi.org/10.1097/ADM.0000000000000986>
15. Grundmann, O., Babin, J. K., Henningfield, J. E., Garcia-Romeu, A., Kruegel, A. C., Prozialeck, W. C., Raffa, R. B., Singh, D., & Smith, K. E. (2020). Kratom use in the United States: a diverse and complex profile. *Addiction*, 116(1), 202-203. <https://doi.org/10.1111/add.15173>

16. Schimmel, J., Amioka, E., Rockhill, K., Haynes, C. M., Black, J. C., Dart, R. C., & Iwanicki, J. L. (2021). Prevalence and description of kratom (*Mitragyna speciosa*) use in the United States: a cross-sectional study. *Addiction*, 116(1), 176-181. <https://doi.org/10.1111/add.15082>
17. Ramachandram, D. S., Chia Siang, K., & R, R. (2023). Comparison of biochemical and safety parameters of regular kratom (*Mitragyna speciosa* Korth.) users at two different time periods. *Journal of Substance Use*, 28(1), 20–25. <https://doi.org/10.1080/14659891.2021.1999513>
18. McCurdy, C. R., Sharma, A., Smith, K. E., Veltri, C. A., Weiss, S. T., White, C. M., & Grundmann, O. (2024). An update on the clinical pharmacology of kratom: uses, abuse potential, and future considerations. *Expert Review of Clinical Pharmacology*, 17(2), 131–142. <https://doi.org/10.1080/17512433.2024.2305798>

**Citation:** Sladky M, Banta-Green C. Kratom: What do we know about its use, safety, and overdose risk? Seattle, WA: Addictions, Drug & Alcohol Institute, Department of Psychiatry & Behavioral Sciences, School of Medicine, University of Washington, April 2024. <https://adai.uw.edu/download/9310/>

This report was produced with support from the Washington State Health Care Authority, Division of Behavioral Health and Recovery (DBHR).