



K42 Drug Overdose Fatality Due to an Herbal Blend Containing Mitragynine and O-Desmethyltramadol

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After attending this presentation, attendees will understand the effects of an herbal blend containing Kratom.

This presentation will impact the forensic science community by becoming aware of the Kratom herbal drug mixture that is available over the internet and contains mitragynine, a Kratom alkaloid, as well as O-desmethyltramadol, and has been implicated in a drug overdose fatality.

A 19-year-old college student was found unresponsive in his bed by his roommate. The prior evening, the decedent was at a party drinking alcohol. After arriving to his residence, he reportedly consumed a mixture of a Kratom tincture with soda and went to bed intoxicated. There were two vials at the scene. One was labeled "Full Spectrum Tincture 10mL Not for Human Consumption" and the other vial was unlabeled. A receipt for "Full Spectrum Alkaloid Tincture 300 mg" from Speciosa Specialist, Chicago, IL was present. Duloxetine and citalopram, which were prescribed to the decedent, were also collected from the scene.

The femoral blood was subject to routine volatiles, acid/neutral, alkaline, and ELISA screening. Ethanol levels were 0.07g/dL and 0.09g/dL within the femoral blood and vitreous, respectively. 9-carboxy-tetrahydrocannabinol was confirmed in the urine by GC/MS. The only other finding per initial screening was O-desmethyltramadol in the alkaline drug screen. Ingestion of tramadol would typically result in the presence of tramadol, N-desmethyltramadol, and O-desmethyltramadol; the presence of only O-desmethyltramadol makes this an unusual finding. In the decedent's femoral blood, duloxetine (0.21mg/L) and O-desmethyltramadol (0.81mg/L) were identified by LC/MS/MS. Due to lack of an authentic standard and reference laboratory test, quantification of Kratom alkaloids was not pursued. However, the presence of Kratom alkaloids including mitragynine or its diastereomers in the urine of the decedent and the two vials collected at the scene was confirmed by full scan LC/MS/MS and comparison to the specific mass spectrometric fragmentation pattern of mitragynine. O-desmethyltramadol was confirmed in the two vials qualitatively by GC/MS.

There is an increasing popularity of "legal highs" which can be purchased over the internet and are not regulated by the Food and Drug Administration (FDA). Therefore, the contents of the products are not always known to the consumers. In this case, a product called "Full Spectrum Alkaloid Tincture" was bought over the internet from Speciosa Specialist. The product description on the website states that it has alkaloids from Kratom that have been "isolated, purified to the highest level, and captured ..."¹ Products on this website are specified as not intended for human consumption. The vials collected at the scene; however, not only contained mitragynine, an alkaloid from Kratom, but O-desmethyltramadol was present as well.

Mitragynine is the alkaloid found in highest concentration in Kratom, which is a leaf native to Southeast Asia and has traditionally been used for medicinal purposes. Kratom was used by the workers as a stimulant and more recently, has been used for pain management and opioid withdrawal. However, it is now considered a controlled dangerous substance in Thailand, Bhutan, Australia, Finland, Denmark, Poland, Lithuania, Malaysia, and Myanmar. There is no medicinal use for Kratom in the United States and it has not been approved by the FDA for any use; however, it is not classified as a controlled dangerous substance in the United States.²

At low doses, mitragynine binds to delta-opioid receptors, but as the dosage increases, it binds the mu-opioid receptors. This receptor binding profile corresponds to the physiologic effects of mitragynine, where it is a stimulant at low doses and has sedative effects at high doses. Mitragynine appears to be a drug with abuse potential with rare toxic effects. No cases of death solely due to mitragynine have been reported in the U.S.; however, over the last six years, mitragynine has been combined with another drug, O-desmethyltramadol, to create a more potent herbal mixture that is often referred to as Krypton. Krypton is available through the internet and has been associated with fatalities as reported in Sweden.³ O-desmethyltramadol is a metabolite of tramadol, which is an opioid agonist used to treat moderate to severe pain. Tramadol acts as a mu-opioid receptor agonist and is a synthetic analog to codeine.

With the growing popularity of Kratom and other opioids that can easily be purchased over the internet, the forensic community should be aware of these drugs. The contents of the herbal extracts are not necessarily listed or known to the consumer since these products are not regulated by the FDA. In this case, the O-desmethyltramadol was incidentally found within the Kratom tincture. Since mitragynine and O-desmethyltramadol are mu-opioid agonists, the combined use of the drugs especially with other drugs and ethanol can lead to sedation and respiratory depression, and can be fatal, as was in this case.

References:

¹<https://speciosa.com/catalog/full-spectrum-alkaloid-tincture-150mg-alkaloids-2-ml.html>. Accessed July 25, 2011.

²Babu, KM, McCurdy, CR, Boyer, EW. "Opioid receptors and legal highs: Salvia divinorum and Kratom." *Clinical Toxicology* 2008; 46(146 – 152).



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³Kronstrand, R, Roman, M, Thelander, G, Eriksson, A. “Unintentional Fatal Intoxications with Mitragynine and O-Desmethyltramadol from the Herbal Blend Krypton.” *Journal of Analytical Toxicology* 2011; 35 (242 – 247).
Mitragynine, Krypton, O-Desmethyltramadol