SDRL Laboratory

TOXICOLOGY TIMES

SDRL Laboratory

(800) 677-7995

www.sdrl.com

A FREE Monthly Newsletter for Substance Abuse and Opioid Treatment Programs from San Diego Reference Laboratory

Volume 10, Issue 6

June, 2020

Dextromethorphan

Dr. Joseph E. Graas, Scientific Director
Dr. Edward Moore, Medical Director

Codeine based cough medications were the standard until the advent of dextromethorphan (DXM). Now virtually all cough suppressants and cold medications are sold over the counter with DXM as the active ingredient. Currently there are over 140 different brands of DXM sold direct to the public for cough suppression and as cold remedies. The compound has an asymmetric center resulting in two different isomers noted as dextro (*d*) and levo (*l*) which result in very different activities at the receptor sites for opiates. The *dextro* form of the drug (*dextro*methorphan) has little or no narcotic activity and thus it is not classified as a opiate. However, it is highly effective in relieving or suppressing coughing (antitussive). The *levo* form of the drug (*levo*methorphan) is a potent narcotic analgesic. Typical doses in these medications range from 7.5 mg to 30 mg per dose and are sold without a prescription. The cough suppressant works better than codeine and has very little to no narcotic effect at the recommended dose. Typical serum levels of DXM at a dose of 20 mg are on the order of less than 2 ug/L at 2.5 hours after ingestion. The conjugated metabolite of DXM is dextrorphan. The typical value for dextrorphan is on average less than 400 ug/L at approximately 2 hours. The half life of DXM is 3.2 to 5.7 hours. Within 24 hours post dose, 43% of the DXM is excreted in the urine.

DXM is a safe and effective drug when taken at the recommended dose of 7.5 to 30 mg as a cold remedy and a cough suppressant. DXM works on the part of the brain that controls the involuntary coughing mechanism, does not have a narcotic effect, and is readily available in drug stores as an over the counter medication. This drug preparation is very well tolerated and reliable as an antitussive agent. This is all true and good in the recommended dose range. However, in larger doses, DXM functions like PCP or ketamine. When DXM is used at a significantly higher dose, it has powerful dissociative properties. The dissociative group of drugs have characteristics which manifest in distorted perceptions of sight and sound and produce feelings of detachment from the environment and self. This occurs when the drugs reduce or inhibit the signals to the active or conscious part of the brain from other parts of the brain. Some journal articles have alluded to the very powerful effect of these drugs in the generation of serotonin, with some users/ abusers claiming the effects are better than MDMA. For these and many other reasons, DXM has earned the name "poor man's PCP".

DXM's progressively severe psychiatric symptoms have been grouped into four dose-dependent presentations. At lower levels (1.5–2.5 mg/kg), MDMA-like perceptual alterations occur. The next level (2.5–7.5 mg/kg) results in impairment of motor, cognitive, and perceptual functioning that is comparable to the combined use of alcohol and cannabis. A higher level (7.5–15 mg/kg) induces intense hallucinations, dissociative symptoms, and agitation like low-dose ketamine use. Concentrations greater than 15 mg/kg result in complete psychophysical dissociation like high-dose ketamine use, with notably violent behaviors, elevated temperatures, and possible death from cardiac or respiratory arrest (condensed from Chad J. Reissig, et al., see below reference). Additionally, a profound withdrawal syndrome has been described consisting of severe vomiting, muscle aches, and diarrhea within the first week of detoxification, followed by night sweats, insomnia, anxiety, and cold intolerance for 3 weeks.

DXM has been reported as a recreational drug especially in the young teen population seeking what is called a serotonin effect. Some also seek out the previously reported effects that are very similar to PCP and Ketamine. Due to its availability and concentration strength it has become a recreational drug of abuse. Many cases of high dosage use has proceeded from casual use to dependency and then to addiction. DXM in high doses with chronic use causes serious liver problems as well as a multitude of psychological conditions. DXM is lethal in the dosage range of 50 to 500 mg/kg as compared to reported abuse dosages of 15 to 20 mg/kg. A single case study suggests that the antidote to DXM overdose is naloxone administered intravenously. Several publications have reported of the change in the way DXM is sold to the public from over the counter to behind the counter, and some states have restricted the usage under 21 years of age. A current internet search found dextromethorphan in the high dose formulations of 30 mg per 5 mL readily available from many suppliers.

Current laboratory techniques do not test for DXM as a drug of abuse. Even if the drug were specifically requested it would be a non-routine specialty test and would be expensive for the laboratory to test and for the client to pay for. Consequently, it is not typically done. A current literature search did not turn up any studies about the current use and abuse of the drug.

References:

Dextromethorphan in Cough Syrup: The Poor Man's Psychosis, Bridgette Martinak, Ramy A. Bolis, Jeffrey Ryne Black, Rachel E. Fargason, and Badari Birur, Author information Copyright and License information Disclaimer, Psychopharmacol Bull. 2017 Sep 15; 47(4): 59 –63.

High doses of dextromethorphan, an NMDA antagonist, produce effects like classic hallucinogens. Chad J. Reissig, Lawrence P. Carter, Matthew W. Johnson, Miriam Z. Mintzer, Margaret A. Klinedinst, and Roland R. Griffiths, Psychopharmacology (Berl). 2012 Sep; 223(1): 1–15. Published online 2012 Apr 13. doi: 10.1007/s00213-012-2680-6

Dextromethorphan Abuse in Adolescence, Jodi K. Bryner, PharmD, Uerica K. Wang, PharmD, Jenny W. Hui, PharmD, Merilin Bedodo, PharmD, Conan MacDougall, PharmD, and Ilene B. Anderson, PharmD., Arch Pediatr,. Adolesc Med. 2006 Dec; 160(12): 1217–1222. doi: 10.1001/archpedi.160.12.1217

*Schneider, SM; Michelson, EA (1991). "Dextromethorphan poisoning reversed by naloxone". Am. J. Emerg. Med. **9** (3): 237–238.*