



Natural Hallucinogens to Avoid

Salvia has been sensationalized in the media since a Saskatoon radio DJ smoked the herb during a live broadcast on December 16, 2010 to raise public awareness of the readily available but potentially dangerous substance.¹ The 2009 Canadian Alcohol and Drug Use Monitoring Survey was the first survey to examine the use of salvia on its own in Canada. Based on the survey, youth aged 15-24 had a 7.3% prevalence of lifetime use.² Angel's trumpet has also recently appeared in the media as it led to the hospitalization of five Moose Jaw youths in September 2010.^{3,4}

Salvia

What is salvia?

Salvia divinorum is a member of the mint family.⁵ It has traditionally been cultivated in Mexico by Mazatec Indians and used by shamans for spiritual and medicinal purposes.⁶ It is quite difficult to grow outside its native habitat of Southern Mexico, but the leaves and extracts are imported to Canada and sold in drug paraphernalia shops.⁷ It is also known as magic mint, diviner's sage, sally D, and purple sticky.⁸

Pharmacology

The active ingredient of salvia is Salvinorin A.⁹ Salvinorin A is a unique selective agonist at the kappa opioid receptor.^{9,10} It has no binding affinity for the 5HT_{2A} receptor which makes it unique compared to other hallucinogens.⁵ Stimulation of kappa opioid receptors generally produces hallucinations, but can also have some unpleasant effect such as dysphoria and diuresis.^{5,11} Salvia use does not cause respiratory depression as it does not stimulate mu opioid receptors.⁵

Dose & Dosage Forms

Commercially available salvia products usually consist of ground salvia leaves that are infused with salvia tincture.¹⁰ Products are generally labeled as 5x, 10x, or 20x, indicating the concentration of Salvinorin A as compared to the natural leaves.¹⁰ Salvinorin A is primarily absorbed by the respiratory tract and through the oral mucosa to a lesser extent.¹² Salvia is typically either inhaled by smoking the tincture-infused leaves or by slowly chewing them in the mouth.^{5,9} Inhalation produces psychoactive effects within seconds and has a duration of 20 to 30 minutes, while the buccal route has an onset of several minutes with a duration up to 1

hour.^{9,11} Salvinorin A is deactivated by the GI system, which explains the popularity of alternative routes of administration.¹³

The dose at which psychological effects become apparent depends on the user's body weight and sensitivity, the dose taken, method of ingestion, and strength of salvia used.¹¹ Effects of salvia have been reported at a very wide range of doses.¹⁴ Salvinorin A is thought to have psychoactive effects at doses as low as 100 mcg.¹³

Salvia Effects

Salvia is primarily used for its hallucinogenic properties.¹⁵ There are many reports of a sensation of pressure on the body, that is pulling or pushing in a particular direction¹⁶, as well as synesthesia (a sensation experienced in a part of the body other than the part stimulated).^{5,17} Salvia can also cause many unpleasant effects such as diaphoresis, chills, headache, lung irritation, insomnia, a sense of physical exhaustion and loss of control.^{5,10,11} Salvia use impairs coordination, speech, judgement, and survival instincts, which puts users at risk of trauma.^{18,19} In addition, the effects of salvia are unknown when it is used in combination with other substances.⁵

Treatment

There are few case reports that describe treatment of salvia intoxication. Since the effects are brief in duration, very few people present to hospital under the influence of salvia. Theoretically, naloxone may reverse the physiological and psychological effects of Salvinorin A at the kappa receptors, as it is a non-selective opioid receptor antagonist.⁵

Is Salvia Legal?

Australia, Japan, Germany, Belgium, and many US states have banned the sale and use of salvia.⁷ Salvia is not covered under Canada's Controlled Drugs and Substances Act, although Health Canada has been studying the herb since 2006.^{20,21} Salvia is currently classified as a Natural Health Product.¹ The Natural Health Products Regulations came into effect in 2004, but due to a large backlog of products needing assessment, the process has taken much longer than expected.²² There are new regulations that now allow the legal sale of Natural Health Products that don't yet have a product license.²³ Natural Health Products that have undergone a preliminary safety, quality, and efficacy assessment have been granted an Exemption Number. NAPRA states that pharmacists can legally sell any Health Care Product than has an Exemption Number.²³ *Salvia divinorum* does not have an Exemption Number, and Health Canada states that when salvia is sold for hallucinogenic purposes, it is considered a violation of the regulations.²¹ Salvia currently remains easily available to the general public at local drug paraphernalia stores and through the internet.

Update March 24, 2011: "Health Canada is proposing to schedule both *S. divinorum* and its main active ingredient salvinorin A under Schedule III to the Controlled Drugs and Substances Act (CDSA) in order to protect the health and safety of Canadians, particularly youth."

<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/life-vie/salvia-eng.php>

Angel's Trumpet

What is Angel's trumpet?

Angel's trumpet (*datura innoxia*) is a member of the Solanaceae family of plants.^{24,25} It is the size of a small bush and produces large pastel-colored flowers that point downwards.²⁶ It is commonly grown in flower beds across North America, including Saskatchewan. Angel's trumpet emerges in mid-spring and survives until the first hard frost.²⁵ It flowers in late summer and early fall.²⁷ It is also known as Angel's tears, Apple of Peru, Green Dragon, and Devil's trumpet.²⁵

Pharmacology

There are 28 various belladonna alkaloids present in the angel trumpet plant.²⁵ Both atropine and scopolamine are found in high concentrations.^{24,25,28} These alkaloids cause postsynaptic competitive inhibition of cholinergic muscarinic receptors.²⁴ Toxic alkaloids are present in all parts of the plant, with the highest concentrations in the flowers and stem.^{25,29}

Dose and Dosage Forms

Each angel's trumpet flower contains approximately 0.2 mg of atropine and 0.65 mg scopolamine.^{28,30} Ingestion of 3-6 flowers is capable of causing hallucinations and delirium, while consuming 9 flowers can lead to life-threatening adverse effects.²⁹ Angel's trumpet is most commonly ingested by drinking a tea made by steeping the flowers in hot water.^{29,31} There have also been reports of intoxication from eating the flowers, seeds and roots, and from inhaling the smoke produced by burning the leaves.³¹ Signs and symptoms of acute anticholinergic activity usually appear between 1 to 4 hours post-ingestion.²⁷ Atropine is rapidly absorbed from the GI tract, and achieves peak plasma concentrations within 2 hours.³² Toxicity from scopolamine can persist for over a day.³²

Effects of Angel's trumpet

Angel's trumpet is used recreationally to induce hallucinations and euphoria.²⁸ Those who abuse it for its psychoactive properties also experience troublesome anticholinergic effects including mydriasis, dry mouth, tachycardia, fever, erythema, constipation, severe thirst, retrograde amnesia and anxiety.^{25,26,29,30} High doses can lead to arrhythmias, cardiovascular collapse, respiratory failure and death.²⁴ Mydriasis and retrograde amnesia are typically the last effects to normalize, as they can take several days to resolve.^{27,29}

Treatment

Activated charcoal has been administered in some patients experiencing angel's trumpet intoxication.²⁹ Activated charcoal is most useful in the first hour after ingestion.²⁷ Gastric lavage has also been recommended in the past, but in most agitated patients the risks of gastric lavage (aspiration, hypoxia, esophageal and gastric erosion, bleeding)³³ outweigh the benefits.^{27,29} Antipsychotics and benzodiazepines are commonly given to sedate the patient and control the hallucinations.²⁹ Anticholinergic sedatives such as phenothiazines and butyrophenones should not be given as they can exacerbate symptoms.^{29,32}

Final points for consideration

Salvia and angel's trumpet are both dangerous natural hallucinogens that should be avoided. Salvia use impairs proper judgment which can lead to serious injuries.^{18,19} Angel's trumpet can cause anticholinergic toxicity at relatively low doses, resulting in hospitalization and possibly death.^{24,29}

In summary, pharmacists should:

- Be prepared to answer questions about the safety of salvia and angel's trumpet. Patients may be more aware of these substances than in the past due to the recent stories in the media.
- Refer patients to a hospital emergency department if they are experiencing signs and/or symptoms of anticholinergic toxicity (tachycardia, mydriasis, delirium, erythema).³⁰
- Encourage anyone under the influence of salvia to remain seated or lying down in a safe location under adult supervision until the effects wear off.

References

1. The StarPhoenix. Coolican L. Saskatoon radio DJ does Salvia live on-air. Saskatoon, SK. [updated 2010 Dec 17; cited 2011 Jan 18]. Available from: <http://www.thestarphoenix.com/entertainment/Video+Saskatoon+radio+does+Salvia+live/3994022/story.html>
2. Health Canada. Canadian Alcohol and Drug Use Monitoring Survey, Summary of Results For 2009. Ottawa, ON. [cited 2011 Jan 24]. Available from: http://www.hc-sc.gc.ca/hc-pps/drugs-drogues/stat/_2009/summary-sommaire-eng.php
3. NewsTalk650 CKOM. Geddes N. Moose Jaw kids hospitalized after eating hallucinogenic Angel's Trumpet plant. Saskatoon, SK. [2010 Sep 21; cited 2011 Jan 13]. Available from: <http://www.newstalk650.com/story/20100921/40603>
4. CBC News. Anderson E. Toxic seeds send youths to hospital. Toronto, ON. [updated 2010 Sep 21; cited 2011 Jan 13]. Available from: <http://www.cbc.ca/health/story/2010/09/21/sk-seeds-toxic-1009.html>
5. Babu KM, McCurdy CR, Boyer EW. Opioid receptors and legal highs: Salvia divinorum and Kratom. *Clin Toxicol.* 2008 Feb; 46:[146-152].
6. Lange JE, Reed MB, Croff JM, Clapp JD. College student use of Salvia divinorum. *Drug Alcohol Depend.* 2008 Apr 1;94(1-3):[263-266].
7. Saskatchewan Drug War News. Hutton D. Legal hallucinogen concerns police. Saskatoon, SK. [updated 2006 Dec 21; cited 2011 Jan 11]. Available from: <http://saskatchewandrugwarnews.blogspot.com/2007/04/salvia-divinorum-another-devils-weed.html>
8. Newsweek. Braiker B. Old Herb, New Controversy. New York, NY. [2008 May 10; cited 2011 Jan 12]. Available from: <http://www.newsweek.com/2008/05/10/old-herb-new-controversy.html>
9. Miller B, Griffin H, Gibson C, Khey D. Trippin' on Sally D: Exploring predictors of Salvia divinorum experimentation. *J Crim Justice.* 2009;[396-403].

10. Gonzalez D, Riba J, Buoso J, Gomez-Jarabo G, Barbanoj M. Pattern of use and subjective effects of *Salvia divinorum* among recreational users. *Drug Alcohol Depend.* 2006;[157-162].
11. *Salvia Divinorum*. Available from: <http://www.salvia.net>
12. Singh S. Adolescent *salvia* substance abuse. Society for the Study of Addiction. 2006 Nov 30.
13. *Salvia divinorum*. Natural Standard. Accessed 2011 Jan 27. Available from: <http://naturalstandard.com>
14. Prisinzano T. Psychopharmacology of the hallucinogenic sage *Salvia divinorum*. *Life Sciences.* 2006; 78;[527-531].
15. Griffin OH, Miller BL, Khey DN. Legally high? Legal considerations of *Salvia divinorum*. *J Psychoactive Drugs.* 2008 June; 40(2):[183-191].
16. Dalgarno P. Subjective effects of *Salvia Divinorum*. *J Psychoactive Drugs.* 2007 June;39(2):[143-149].
17. Dictionary.com. Search term "synesthesia". Accessed 2011 Jan 26. Available from: <http://www.dictionary.com>
18. Erowid. Documenting the Complex Relationship Between Humans & Psychoactives. Available from: <http://www.erowid.org>
19. Lange JE, Daniel J, Homer K, Reed MB, Clapp JD. *Salvia divinorum*: effects and use among YouTube users. *Drug Alcohol Depend.* 2010 Apr ;108(1-2):[138-140].
20. Canada.com. Shore R. *Salvia* 'the most potent' natural hallucinogen. Toronto, ON. [updated 2010 Dec 17; cited 2011 Jan 25]. Available from: <http://www.canada.com/entertainment/Salvia+most+potent+natural+hallucinogen/3991517/story.html>
21. Telephone conversation with Health Canada, Office of Controlled Substances. 2011 January 27.
22. CBC News. Wyld A. Hallucinogenic *salvia* no longer legal in Canada. Toronto, ON. [updated 2010 Oct 19].
23. Canadian Healthcare Network. Felix S. Unlicensed NHPs may receive Exemption Numbers. 2010 Aug 18. Accessed 2011 Jan 27. Available from: <http://www.canadianhealthcarenetwork.ca>
24. Hanna JP, Schmidley JW, Braselton WE Jr. *Datura delirium*. *Clin Neuropharmacol.* 1992 Apr;15(2):[109-113].
25. Krenzelok EP. Aspects of *Datura* poisoning and treatment. *Clin Toxicol.* 2010 Feb; 48(2):[104-110].
26. Florida Poison Information Center. Tampa General Hospital. "Natural" doesn't mean "safe". Tampa, FL. [updated 2008; cited 2011 Jan 24]. Available from: <http://poisoncentertampa.org/resources/1/substances/mushrooms-angels-trumpet.pdf>
27. Wiebe T, Sigurdson E, Katz L. Angel's trumpet (*Datura stramonium*) poisoning and delirium in adolescents in Winnipeg, Manitoba: Summer 2006. *Pediatr Child Health.* 2008 March; 13(3);[193-196].
28. Jellin J, editor. Angel Tulip. Natural Medicines Comprehensive Database. Accessed 2011 Jan 20. Available from: <http://www.naturaldatabase.com>.

29. Gopel C, Laufer C, Marcus A. Three cases of angel's trumpet tea-induced psychosis in adolescent substance abusers. *Nord J Psychiatry*. 2002; 56(1);[49-52].
30. Angel's Trumpet (Brugmansia And Datura Species). *Natural Standard*. Accessed 2011 Jan 20. Available from: <http://naturalstandard.com>
31. . Isbister GK, Oakley P, Dawson AH, Whyte IM. Presumed Angel's trumpet (Brugmansia) poisoning: clinical effects and epidemiology. *Emerg Med*. 2003 Aug; 15(4);[376-382].
32. Mark S, Goldman M. UpToDate. Anticholinergic poisoning. Last updated 2008 June 12; cited 2011 Jan 26. Available from: <http://www.uptodate.com>
33. Burns M, Schwartzstein R. UpToDate. Decontamination of Poisoned Adults. Last updated 2009 Dec; cited 2011 Jan 26. Available from: <http://www.uptodate.com>