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Xylitol Toxicity in Dogs

What is Xylitol?

Xylitol is a naturally occurring substance that is widely used as a sugar substitute. Chemically, it is a sugar alcohol, and in nature it is found in berries, plums, corn, oats, mushrooms, lettuce, trees, and some other hardwood trees and fruits.

Commercially, most xylitol is extracted from corn fiber, trees and other vegetable material. Although it has been used as a sugar substitute for decades, its popularity has increased dramatically in the last few years.

How is it used?

Xylitol is manufactured into a white powder that looks and tastes similar to sugar. In many countries it has been approved for use in oral care products, pharmaceuticals and as a food additive. Products that may contain xylitol include sugar-free gum, candies, breath mints, baked goods, cough syrup, children's chewable vitamins, mouthwash, and toothpaste, to list a few.

Why is xylitol increasing in popularity and use?

Xylitol is about as sweet as sucrose, but contains only about two-thirds of the calories. As a sugar substitute, it is lower on the glycemic index, a scale that ranks carbohydrate-rich foods by how much they raise blood sugar levels compared to glucose. Being lower on the glycemic index makes xylitol useful for diabetics or people on low carbohydrate diets.

With respect to oral health, research has shown that xylitol helps reduce the formation of plaque, inhibits dental cavities, and stimulates the production of saliva.

How safe is xylitol?

Xylitol is safe for use in humans. Xylitol, like most sugar alcohols, may have a mild laxative effect when eaten in large amounts, when first introduced to a diet. This occurs because, until the digestive system adapts, xylitol may not be completely digested in the intestines. This causes mild diarrhea and/or mild intestinal discomfort.

"Xylitol is extremely toxic to dogs."

In dogs, however, xylitol is extremely toxic. Even small amounts of xylitol can cause hypoglycemia (low blood sugar), seizures, liver failure or even death.

Why is xylitol toxic to dogs?

In both humans and dogs, the level of blood sugar is controlled by the release of insulin from the pancreas. Xylitol does not stimulate the release of insulin from the pancreas in humans. However, when non-primate species (e.g., dogs) eat something containing xylitol, the xylitol is quickly absorbed into the bloodstream, resulting in a potent release of insulin from the pancreas. This rapid release of insulin results in a rapid and profound decrease in the level of blood sugar (hypoglycemia), an effect that occurs within 10–60 minutes of eating the xylitol. Untreated, this hypoglycemia can be life-threatening.

How much xylitol is poisonous to a dog?

The dose of xylitol that can cause hypoglycemia in the dog is reported as 50 milligrams (mg) of xylitol per pound of body weight (100 mg per kilogram). The higher the dose ingested, the greater the risk of liver failure. Sugar-free gum is a frequent source of xylitol poisoning with a wide range of xylitol in different brands and flavors of gum, anything from 1 mg to 1 gram per piece. It is important to identify whether a toxic amount has been ingested. With certain brands of gum (which contain 1 g/piece), only 2 pieces of gum can result in severe hypoglycemia in a 45 pound dog, while 10 pieces could result in liver failure. Other brands may contain less xylitol and be somewhat less toxic.

"Xylitol is estimated to be 100 times as toxic as chocolate to dogs."

Intake of very high doses of xylitol (500 mg/kg body weight) has been implicated in liver failure in dogs.

What should I do if my dog eats something containing xylitol?

If you suspect that your pet has eaten a xylitol-containing product, please contact your veterinarian **immediately**. Bring the product package with you, or report the brand name and flavour to your veterinarian.

Do not induce vomiting or give anything orally to your dog unless specifically directed to do so by your veterinarian. It is important to get treatment for your dog as quickly as possible. As some dogs may already be hypoglycemic, inducing vomiting can make them worse!

What are the symptoms of xylitol poisoning?

Symptoms of xylitol toxicity develop rapidly, usually within 15–30 minutes of consumption. Signs of hypoglycemia may include any or all of the following:

- Vomiting
- Weakness
- Incoordination or difficulty walking or standing (walking as if drunk)
- Depression or lethargy
- Tremors
- Seizures
- Coma

In severe cases, the dog may develop seizures or liver failure. Dogs that develop liver failure from xylitol poisoning often show signs of hypoglycemia.

How is xylitol poisoning diagnosed?

A presumptive diagnosis of xylitol poisoning is made if there is a known or possible history that the dog ate something containing xylitol, coupled with symptoms of hypoglycemia. Since toxicity develops rapidly, your veterinarian will not wait for a confirmed diagnosis before beginning treatment.

Is there an antidote for xylitol toxicity?

No. There is no antidote for xylitol toxicity, although treatment with sugar supplementation, IV fluids, and liver protective drugs is beneficial.

How is xylitol poisoning treated?

Fast and aggressive treatment by your veterinarian is essential to effectively reverse any toxic effects and prevent the development of severe problems.

If your dog has just eaten xylitol but has not yet developed any clinical signs, your veterinarian may induce vomiting to prevent further absorption, depending on what your dog's blood glucose level is. If clinical signs have developed, treatment will be based on the symptoms that are being shown. Since xylitol toxicity can cause both low blood glucose and low potassium levels, your veterinarian will perform blood work to determine whether these problems need to be treated. In all cases, your dog will require hospitalization for blood sugar monitoring, dextrose administration, intravenous fluids, liver protectants, and any other supportive care that may be needed. Blood work should be monitored frequently to make sure that blood sugar and liver function remain normal.

What is the prognosis for recovery from xylitol poisoning?

The prognosis is good for dogs that are treated before symptoms develop, or for dogs that develop uncomplicated hypoglycemia that is reversed rapidly. If liver failure or a bleeding disorder develops, the prognosis is generally poor. If the dog lapses into a coma, the prognosis is very poor.

How can I prevent this problem?

If you personally use products containing xylitol, make sure they are stored safely, out of reach of your pets. Do not share any food that may contain xylitol with your pets. Only use pet toothpaste for pets, never human toothpaste. Keep in mind that there are some veterinary products that contain small amounts of xylitol (e.g., gabapentin medication, mouthwashes). At prescribed doses, these should not result in xylitol poisoning; however, if ingested in large amounts, they can potentially result in poisoning.

The toxicity of xylitol for cats and other species is not documented at this time, although there is some concern that other non-primate species (e.g., cats, ferrets, etc.) may react to xylitol in a similar manner to dogs.

With any poisoning, prompt decontamination and treatment is always warranted, as it is less dangerous to your pet, and less expensive for you to treat early. Rapid diagnosis and treatment is imperative!

Reviewed and edited May 2014 by Norm Nasser, DVM, Emergency Service Veterinarian at the Toronto Veterinary Emergency Hospital.

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