

Perilous Foods for small animals- Clinical signs and therapeutic management

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Abstract

There are a number of foods that are detrimental to dogs and cats but are totally safe for human consumption. In the past decade, there have been reports of food-related poisoning cases involving the inadvertent ingestion of chocolate and chocolate-based products, grapes and their dried products, *Allium* spp. (garlic, onion), sweetener like xylitol, alcoholic beverages, and unbaked bread dough all over the world. The poisoning incidents are typically brought on by a lack of awareness among the general population regarding the considerable health risk that these items can cause to dogs and cats. The current review attempts to summarise current understanding of popular food products frequently involved in the poisoning of small animals, particularly dogs.

Methylxanthines- Chocolates and chocolate-based products

Methylxanthines are plant-derived alkaloids that are typically present in a range of foods, beverages, human medications, and other household products. Examples of methylxanthines include caffeine, theobromine, and theophylline. Presence of caffeine is seen in tea, coffee, and many soft drinks as an additive. Cacao seeds and the goods made from them, like chocolate, contain

theobromine. Tea contains theophylline in addition to caffeine. Additionally, theophylline is frequently utilised as a bronchodilator in anti-asthma medications, while caffeine is used in human treatment to promote mental alertness.

Mechanism of action and Clinical signs

Methylxanthines inhibit cellular phosphodiesterases and oppose cellular adenosine receptors, increasing cyclic adenosine monophosphate (cAMP).

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Additionally, methylxanthines boost cellular calcium entry and catecholamine release while decreasing the sarcoplasmic reticulum's ability to sequester calcium inside cells, which increases the ability of muscles to contract. The combined effects of these actions cause diuresis, activation of the CNS and cardiac muscle, and relaxation of smooth muscle, particularly bronchial muscle. Polydipsia, restlessness, vomiting, urinary incontinence are some initial clinical signs observed within 2 to 4 hours of ingestion. Hyperthermia and tachycardia can be manifested in excited dogs. Respiratory failure or cardiac arrhythmia can be the reason for death if intoxication progresses.

Treatment and management

Gastric lavage and emesis for decontamination, multiple doses of activated charcoal can be administered and scrupulous supportive care can be provided. Prognosis is generally good, if effectual decontamination is attained within 2 to 4 hours of ingestion.

Allium

Allium is the genus that includes the onion (*Allium cepa*), garlic (*Allium sativum*), leek (*Allium porrum*), and chives (*Allium schoenoprasum*) (Amaryllidaceae family). These bulbous plants are frequently utilised (fresh, cooked, or dehydrated) as ingredients in various recipes. They are highly aromatic and

provide a distinctive odour when crushed. Organosulfoxides are the poisonous ingredients that make them toxic for consumption. Organosulfoxides become a complicated mixture of sulphur compounds when the plant is chewed.

Mechanism of action and Clinical signs

Oxidative hemolysis, characterised by the production of Heinz bodies in the erythrocytes and the development of methemoglobinemia, is the main toxicological mechanism of Allium produced sulphur compounds. The poisonous properties of Allium spp. are not diminished by cooking, drying, or processing. Due to their great susceptibility to Allium toxicosis, cats and dogs only need to consume 5 g/kg of onions or 15–30 g/kg of onions, respectively, to experience clinically significant hematologic abnormalities. Akita, Shiba, and Jindo breeds of dogs have inherited high levels of erythrocyte-reduced glutathione and potassium, which makes them more vulnerable to the oxidative damage caused by onions.

Treatment and management

Depending on the doses consumed, clinical indications of allium toxicosis may start to manifest 1 day or several days after intake. Initial symptoms of common clinical conditions include nausea, diarrhoea, abdominal pain, appetite loss, and sadness. Pale mucous membranes, weakness, rapid

breathing and heartbeats, jaundice, and dark urine (reddish or brown) indicative of hemoglobinuria are subsequently seen as a result of the developing anaemia. There isn't a specific treatment for allium toxicosis. If there are no aggravating problems and less than two hours have passed since consumption, inducing vomiting in asymptomatic dogs and cats should be taken into consideration. After the vomiting has stopped, the administration of activated charcoal is advised. Once clinical symptoms appear, supportive care should be the focus of treatment. Animals who are extremely anaemic could need a blood transfusion.

Grapes and their dried products

It has been noted that grapes and their dried products, such as raisins, sultanas, and currants, can lead to renal failure in dogs. The fruits can be consumed raw or cooked as a component of baked goods such scones, snack bars, malt loaves, fruit cakes, and mince pies. Consumption of marc (the residue of grapes after pressing) has also been linked to the toxic condition.

Mechanism of action and Clinical signs

Unknown are the toxic underpinnings and the precise mechanism of grape-induced nephrotoxicity. The latter causes hypovolemic shock and renal ischemia and appears to be caused by a nephrotoxic substance or an

idiopathic reaction. The sensitivity of dogs to grapes and their dried derivatives varies significantly. After consuming up to 1 kg of raisins, some animals reportedly remained symptom-free while others perished after taking just a handful. Therefore, consumption of these fruits in any amount should be taken into account as a potential clinical issue. Vomiting that occurs within 24 hours after intake is the most common clinical symptom. Additionally documented symptoms include diarrhoea, anorexia, tiredness, and stomach pain. Grapes and grape derivatives that have partially digested may be found in faeces, vomit, or both. Within a short time, oliguria, anuria, polydipsia, proteinuria, and high serum concentrations of creatinine and urea appear as symptoms of renal insufficiency or failure. In general, dogs with oliguria or anuria have terrible prognoses.

Treatment and management

The length of time it takes to administer the medication could have a big impact on how things turn out. Given the wide range of tolerance displayed by dogs, any consumption of grapes or grape-derived items by dogs should be treated with contempt. It is strongly advised to immediately decontaminate after recent ingestion with emetics and repeated doses of activated charcoal. For a minimum of 48–72 hours, all dogs should get intensive intravenous fluid

therapy, and for at least 72 hours, their renal function should be followed.

Xylitol

Xylitol is a five-carbon sugar alcohol mainly used as an artificial sweetener in various products, containing bread, candy, cookies, sugar-free gum and other baked goods. Xylitol is also encompassed in a diversity of medical and dental care products pertaining to its antibacterial activity and palatability. Risk of developing severe, life-threatening clinical signs is common in species like dogs since xylitol is an ingredient in drinking water additives for pets.

Mechanism of action and Clinical signs

Hypoglycemia is observed at a lower dose of 0.03 g/kg of xylitol in dogs since it is a potent stimulator of insulin release, leading to exaggerated decrease in blood glucose levels. There have been reports of liver failure in dogs associated with xylitol ingestion. Adenosine triphosphate (ATP) depletion consequent to xylitol metabolism or reactive oxygen species generation which leads to hepatocyte damage could be a possible mechanism leading to hepatic necrosis. Hypoglycemia or hepatopathy or both are some of the clinical signs of xylitol toxicity in dogs. Initially vomiting can be observed followed by lethargy, ataxia, collapse, and seizures in hypoglycemia which may progress within 30–

60 min after consumption or may be deferred up to 12 h after ingestion. Vomiting, lethargy, icterus, and coagulopathic signs, such as ecchymoses, petechiae, and gastrointestinal hemorrhages, may be noticed in dogs developing hepatopathy.

Treatment and management

Xylitol toxicity can be treated by supportive care and monitoring. Early induction of emesis is preferred in asymptomatic animals. Due to poor binding ability to xylitol, usage of activated charcoal is not recommended. Monitoring of liver function and blood glucose is required. Intravenous dextrose should be administered in case of dropping in blood glucose level is observed.

Ethanol

Ethanol, often known as ethyl alcohol, is a two-carbon alcohol that can be found in many goods, including alcoholic beverages, paint and varnish, medications, perfume, mouthwash, several thermometer kinds, and some antifreeze. Additionally, it is used to treat dogs and cats who have been poisoned by ethylene glycol, as a disinfectant, as a fuel replacement, and as a competitive substrate when delivered intravenously. Small animals commonly develop ethanol toxicosis as a result of unintentional alcohol consumption. Dogs have also been known to become

intoxicated with ethanol after eating rotten apples, sloe berries used to produce sloe gin, and uncooked bread and pizza dough. *Saccharomyces cerevisiae*, a yeast, is present in the latter and metabolises carbohydrate substrates to produce ethanol and carbon dioxide.

Mechanism of action and Clinical signs

Alcohol is quickly absorbed from the digestive system after ingestion and passes across the blood-brain barrier. The N-methyl-d-aspartate glutamate receptors in brain cells that control the release of cyclic guanosine monophosphate are thought to be inhibited by ethanol. Clinical symptoms, such as central nervous system (CNS) depression, ataxia, lethargy, drowsiness, hypothermia, and metabolic acidosis, typically appear within an hour of consumption. Animals may experience severe respiratory depression and go into a coma.

Treatment and management

Animals that consume raw bread dough produce excessive gas may develop a bloated and uncomfortable abdomen. Only in cases of very recent consumption by animals that show no signs of illness should emesis be provoked, and even then, with utmost caution. Hemodialysis has recently been demonstrated to help patients with severe toxicosis remove ethanol quickly. Yohimbine is an alpha 2-adrenergic antagonist that easily passes the

blood-brain barrier, has been suggested as an arousal medication in the management of ethanol intoxication.

Conclusion

The current review focusses on the concern of small animals, especially dogs, being exposed to potentially dangerous food items that are frequently found in the home. There is a discernible trend in exposure as the habit of sharing food items with our pet animals are being encouraged in households. Public awareness of the risk that some foods may possess to canine and feline health still has substantial gaps. The prognosis of instances of food-related intoxication can be significantly improved by obtaining a precise history of exposure, early detection of clinical signs, and prompt installation of suitable therapy. The sterling way to reduce the incidence of these poisoning episodes is to prevent exposure.