

# The effects of toxicity biology essay

[Science](#), [Biology](#)



D: logo upm. jpgShw4403 : FEEDS AND FEEDING ONIONS AND RAISINS

TOXICITY IN DOGS NAME : LIZMA FELISHA BINTI MAZLAN MATRIC'S NO :

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12 INTRODUCTION Based on world statistics, dogs is one of the species that owners most frequently seek assistance with potential poisonings that accounting to 95-98% of all reported animal cases. Exposures occur more commonly in the summer and in December that is associated with the holiday season. Almost more than 90% of animal poisonings are accidental and acute in nature and occur near or at the animal owner's home. Feeding human foodstuff to pets may also prove dangerous for their health. The aim of this report is to alert the most toxic food items that should not be fed intentionally or unintentionally to dogs such as onions or garlic and raisins or grapes. There are many other toxic foods which also cannot be fed to dogs such as chocolate, caffeine, and other methylxanthines, avocado, alcohol, nuts, xylitol contained in chewing gum and candies. CONTENTS ONIONS AND GARLICS Onions whether it is raw, cooked, and dry in powdered form or even table scraps containing cooked onions or garlic are very poisonous to dogs although it is not known what quantity needs to be eaten. Onion contains the

toxic ingredient, thiosulphate and allyl propyl disulfide which can harm the dogs. Eventhough garlcs also contain the toxic ingredient thiosulphate, it seems that garlic is less toxic and large amounts would need to be eaten to cause illness.

## **Effects of Toxicity**

At first, dogs which are affected by onion poisoning will show gastroenteritis with vomiting and diarrhoea. Besides that, they will show no interest in food and will be not energetic. The red pigment from the burst of erythrocytes will appear in an affected animal's urine and the dog will becomes breathless.

The breathlessness occurs because the erythrocytes that carry oxygen through the body are reduced in number and cause haemolytic anaemia accompanied by the formation of Heinz bodies in erythrocytes of dogs (Stallbaumer, 1981). Heinz body anaemia is an uncommon finding in dogs as well as few other toxicants, such as methylene blue, acetaminophene, zinc, benzocaine, vitamin K, phenylhydrazine (Houston and Myers, 1993), so onion ingestion must always be suspected in such situations. Research has shown that consumption of 15 to 30 g/kg in dogs has resulted in clinically important hematologic changes (Cope, 2005). Onion toxicosis is commonly observed in dogs which ingest more than 0. 5% of their bodyweight in onions at one time. High dosage of onion (600–800 g) in one meal or over a few days can damage red blood cells and cause haemolytic anaemia accompanied by the formation of Heinz bodies in erythrocytes. Daily feeding of onions contribute towards cumulative effect due to ongoing formation of Heinz bodies versus a single exposure with a wide gap until the next exposure, allowing the bone marrow time to regenerate the prematurely destroyed red blood cells.

According to Harvey JW, Rackear D, in his experiment, within one day following a single oral dose of dehydrated onions, dogs were found to have large numbers of Heinz bodies within erythrocytes. The percentage of erythrocytes that contained Heinz bodies increased slightly to a maximum on day 3 and then declined. The turbidity index increased more gradually with a maximal value on day 4. Erythrocytes with haemoglobin contracted to one side of the cell (eccentrocytes) also appeared after onion feeding. Eccentrocytes are conditions where there is direct injury to the erythrocyte membrane. As with Heinz body-containing cells, the percentages of eccentrocytes present declined as anaemia developed. The packed cell volume began to decrease one day after onion administration. A mean decrease of 19 percentage points was reached by day 5. The most anaemic dogs had evidence of intravascular haemolysis. Reticulocytosis was first observed five days after onion administration. A slight increase in methemoglobin content was measured four hours after onion administration. No significant changes in erythrocyte reduced glutathione concentration were measured. Transient neutrophilia occurred concomitant with the peak reticulocyte response. Meanwhile, Lee KW, Yamato O, Tajima M, Kuraoka M, Omae S, Maede Y. from Department of Veterinary Clinical Sciences, Graduate School of Veterinary Medicine, Hokkaido University, Sapporo, Japan has conducted an experiment to determine whether dogs given garlic extract developed haemolytic anaemia and to establish the hematologic characteristics induced experimentally by intragastric administration of garlic extract. There were 8 healthy adult mixed-breed dogs used in this experiment. 4 dogs were given 1.25 ml of garlic extract/kg of body weight (5

g of whole garlic/kg) intragastrically once a day for 7 days. The remaining 4 control dogs received water instead of garlic extract. The complete blood counts were performed, and methemoglobin and erythrocyte-reduced glutathione concentrations, percentage of erythrocytes with Heinz bodies, and percentage of eccentrocytes were determined before and for 30 days after administration of the first dose of garlic extract. Ultra structural analysis of eccentrocytes was performed. Compared with initial values, erythrocyte count and haemoglobin concentration decreased to a minimum value on days 9 to 11 in dogs given garlic extract. Heinz body formation, an increase in erythrocyte-reduced glutathione concentration, and eccentrocytes were also detected in these dogs. However, no dog developed haemolytic anaemia. It is observed, the constituents of garlic have the ability in oxidizing erythrocyte membranes and haemoglobin thus inducing haemolysis associated with the appearance of eccentrocytes in dogs. Eccentrocytosis appears to be a major diagnostic feature of garlic-induced haemolysis in dogs.

## **Treatment of Toxicity**

It is important that the animals remain hydrated; anti emetics may be given to control persistent vomiting. Non enzymatic reductants such as ascorbic acid may also be useful (in dog 30 mg/kg bodyweight, intravenous, each 6–8 hours). In severely poisoned animals blood transfusions have been successfully employed.

## **RAISINS AND GRAPES**

Traditionally, many dog owners and dog trainers fed their dogs with raisin and grapes as ‘ healthy’ treats. However, without them knowing, raisins and grapes in large quantities are lethal to dogs. Raisins are more concentrated than grapes due to dryness in nature are having relatively more toxic than grapes. According to the Merck Veterinary Manual, the estimated toxic dose of grapes is 32 grams of grapes per kilogram of body weight (0. 5 ounces per pound) and for raisins it is 11-30 g/kg (0. 18 to 0. 48 oz/lb). The Animal Poison Control Center (APCC) listed out possibilities that may cause raisin and grapes toxicity. First possibility is due to an agent in grapes and raisins themselves. Second possibilities are fungicides, herbicides, or pesticides contamination followed by third possibility which is heavy metals. Fourth possibility includes high amounts of Vitamin D. Indeed, some researchers suspect that a mycotoxin (a toxic substance produced by a fungus or mold) may be the cause. However, so far no toxic agent has been identified. Since it is currently unknown why these fruits are toxic, any exposure should be a cause for concern. Recently, unpublished data source declared that the toxic component is within the flesh of the grape/raisin, not the seed. Grape seed extract or grape juice therefore appears to be safe. Toxicity has been associated with seedless grapes, so the toxin is unlikely to be within the seeds. It is then possible that grape seed extract is safe to use, however, this has not been conclusively proven. The reason this is important to know is that grape seed extract is a powerful antioxidant that may be helpful in the treatment of arthritis and other inflammatory conditions, and some dog owners use this in their older dogs. There is no information available about

grape juice or wine. However, since the toxic agent is not known, current recommendations are to avoid giving grape juice or wine to dogs.

## **Effects of Toxicity**

If dogs have ingested large quantities of raisins or grapes, acute kidney failure will usually develop within 1-3 days. Symptoms of kidney failure include vomiting, diarrhoea, dehydration, abdominal pain, and tremors or seizures. A review of cases from ASCPA Animal Poison Control Center ( APCC ) computerised database revealed ingestion of raisins by five dogs and ingestion of grapes by five dogs. Eight of the cases were reported from 1999 through March 2001. The estimated amount of grapes or raisins was known in four dogs and ranged between 9 oz and 2 lb (0. 41 and 1. 1 oz/kg). The grapes ingested included fresh grapes from grocery stores or vines in private yards, or grapes crushing or fermented grapes from wineries. The raisins involved were mostly commercial sun-dried raisins of various brands. Vomiting was reported in all dogs and began with in the first few hours of ingestion. Most affected dogs passed partially digested raisins or grapes in the vomitus, faeces, or both. Anorexia, diarrhoea, lethargy and signs of abdominal pain were also reported. Clinical signs continued for several days to three weeks following ingestion. Hypercalcaemia which is a condition where there is elevation of calcium level in blood was recorded in seven dogs: range, 12. 3 to 26 mg Ca/dl. Hyperphosphatemia which is a condition of elevation of phosphate level in blood was also recorded in seven dogs; range, 6. 4 to 22 mg/P0/dl. There was also an increase calcium and phosphorus product recorded in seven dogs, ranges 81 to 390 mg/dl, high serum creatinine concentrations recorded in nine dogs; range 4. 3 to 18

mg/dl developed 24 hours to several days after ingestion. Oliguria (low output of urine) or anuria (suppression of urine formation and excretion) was observed in five dogs.

## **Treatment of Toxicity**

Decontamination by emesis, followed by administration of activated charcoal, is important in all recent ingestions. Emesis should be induced within the first 2 hours after exposure. The longer emesis is delayed after exposure, the less likely it is to be effective. Fluid diuresis for the first 48 hours may help prevent ARF from developing. Blood chemistry values, including renal enzymes, should be monitored for 72 hours. Medications such as furosemide, dopamine, or mannitol can be used in anuric renal failure. Hemodialysis or peritoneal dialysis may be of benefit if available.

**CONCLUSION**In summary, it is proven that onions and garlic as well as raisins and grapes cause toxicity to canines. If animals accidentally consume this type of toxic food, supportive care such as hospitalisation, administration of intra-venous fluids, blood transfusions may be helpful. Treatment is advocated of ingestion of any quantity. For recent ingestions gastric decontamination should be considered, and use of adsorbents, but thereafter management is largely supportive. Nevertheless, even taking into account that lethal effects are infrequent in dogs, avoiding exposure to any kind of toxic food to dogs seems to be the best preventive health strategy. Any decision in providing best quality of nutrition for dogs and should be discussed with the veterinarian or pet nutritionist. **APPENDICES** Heinz

body <http://medicine.creighton.edu/mmsa/photogallery/1.jpg> Figure 1.

Blood smear showing widespread Heinz body in erythrocyte **D: FORMATION**



OF HEINZ BODY. gifFigure 2 : Mechanism of formation of Heinz

bodyEccentrocyteshttp://t2. gstatic. com/images? q= tbn: ANd9GcQkDUgtt\_-

i942CTetXQ5XCzqW\_1MVKVZge42L5409llxZ0uEFXaQFigure 3 : Haemoglobin

contracted to one side of the cell

## **Acute renal failure**

### **Normal kidney**

Chronic renal failurehttp://vetnext. com/fotos/cat\_kidney. jpgFigure 4 :

Grapes and raisins causing acute renal failure

## **SYMPTOMS OF ACUTE RENAL FAILURE**

### **NUMBERS OF AFFECTED DOGS**

Anorexia6Diarrhoea5Lethargy4Abdominal pain3Hypercalcaemia7.

Hyperphosphatemia7Increase calcium and phosphorus product7High serum

creatinine concentrations9Oliguria/Anuria5Table 1 : Renal Failure associated

with ingestion of grapes or raisins in dogs.