

# Acute alcohol intoxication in a dog

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A six-year-old, intact male, mixed-breed dog weighing 18 kg was presented to the Western College of Veterinary Medicine approximately seven hours after ingesting two ounces of dark rum (40% alcohol/volume; 80 proof). Prior to his presentation, the dog had vomited twice and the owner reported that he was very incoordinated and extremely thirsty. No previous health problems were noted.

On examination, the dog was very depressed, disoriented and unable to rise. He whined incessantly and thrashed about as he attempted to rise. The odor of alcohol was apparent on his breath. The rectal temperature was 36.7°C, the heart rate 198/minute, and the respiratory rate 24/minute. The mucous membranes were pink and the femoral pulses were strong. The dog was assessed to be approximately 8% dehydrated.

The patient was given a balanced electrolyte solution (Lactated Ringer's Injection USP, Baxter Corporation, Toronto, Ontario) IV (approximately 165 mL/hour for 12 hours) to replace fluid deficits and provide maintenance requirements, and placed in a dark, quiet cage on a heating pad. Within two hours of the therapy being started, the dog was resting more comfortably and had stopped whining and within six hours, the body temperature had risen to 37.5°C and the heart rate was 132/minute. Six hours later, the dog was able to walk and was drinking well on his own. At this time, the intravenous fluids were disconnected. Twenty-four hours after being presented, the dog was bright, alert and willing to eat, and his rectal temperature was 38.3°C. His neurological status was assessed as normal and the dog was discharged from the hospital. No further problems have been encountered.

Alcohol intoxication in small animals generally occurs as a result of ingesting alcoholic beverages (1-4). This dog drank the alcohol supposedly while the owner was not looking but alcoholic beverages have been given to pets by owners wishing to see what effect the alcohol will have (4). Alcohol intoxication has also occurred as the result of ingesting sourdough starter containing brewer's yeast or baker's yeast (5), and dermal absorption of alcohol has been reported in a litter of six-week-old puppies shampooed with an alcohol-based dishwashing detergent (6). Ethyl alcohol is also found in many over-the-counter liquid formulations of cough, cold, and allergy medication (7), and in a wide variety of home remedies to which small animals could be exposed (4).

Ethyl alcohol is classified as a potent central nervous system (CNS) depressant and general anesthetic (4,6). The primary cause of death in ethanol intoxication is respiratory failure (4,5). Alcohol has a relatively low

therapeutic index. Du Jardin-Beaumetz (8) gave the lethal dose (LD<sub>50</sub>) of 95% ethyl alcohol in dogs as 5.5-6.5 mL/kg with death occurring 12-24 hours after ingestion (1). This volume of alcohol equates to approximately 4.1-4.9 g/kg of 100% ethanol (the density of 95% ethanol is approximately 816 mg/mL (4); the specific gravity of 100% ethanol is 0.789 (9)). The toxic dose of pure alcohol (200 proof; 100% alcohol/volume) in all species has recently been reported to be of the order of 8 g/kg in a single dose (10). The dog in this report had ingested two ounces of 40% alcohol/volume which equates to 22.73 mL (1.26 mL/kg) or 17.93 grams (approximately 1 g/kg), enough to place the dog in a drunken stupor.

Alcohol reportedly affects the nerve centers in the reverse order of their evolutionary development, the higher cerebral functions are the first to be affected and the respiratory and cardiovascular systems are affected last (10). In acute alcohol poisoning, there may be an initial period of excitement in which the animal whines and appears agitated (3,10). Recent evidence obtained in man and in mice suggests an association of CNS behavioral change with impaired functioning of the cerebral muscarinic cholinergic systems (11). Enhanced inquisitiveness and loss of motor coordination are also frequently observed in acute alcohol ingestion (4). Vomiting is not unusual as ethanol is an irritant to the gastric mucosa and has a direct stimulatory effect on the vomiting center (4). Hypothermia is also commonly reported as peripheral vasodilation occurs (4). Dehydration is a common problem as alcohol ingestion causes serum hyperosmolality with subsequent osmotic diuresis (3). Vomiting may also contribute to dehydration. Despite increased water intake prior to presentation, the dog was estimated to be 8% dehydrated on admission.

Following an initial period of excitation, intoxicated dogs generally become ataxic and incoordinated, and then collapse. This may be followed by coma and death from respiratory paralysis (3,10).

Clinical findings in dogs and humans with ethanol intoxication can be correlated with blood ethanol concentrations. Respiratory depression occurs at 400-500 mg/dL; coma at 450-500 mg/dL; and death above 600 mg/dL (12). Death in man has been reported with a blood ethanol concentration as low as 260 mg/dL (12). The ability to check alcohol concentrations can aid in assessing the severity and monitoring the progress of toxicosis and is recommended in cases of suspected toxicosis (2,5). Blood alcohol concentrations were not determined in this case.

Ethanol is an aliphatic alcohol and is highly lipid soluble. Consequently, following oral exposure, it is very rapidly absorbed from the gastrointestinal tract (4,12,13). Following its absorption, the ethanol is widely distributed throughout the total body water. Approximately 80-85% of the ethanol is detoxified in the liver with alcohol dehydrogenase acting as the principal enzyme in the oxidation process. Alcohol

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dehydrogenase metabolizes the ethanol to acetaldehyde. The acetaldehyde is then oxidized, primarily by aldehyde dehydrogenase, to form acetate. After its activation, the acetate combines with coenzyme A to form acetyl coenzyme A, which is then available to enter any of the metabolic pathways normally utilized by this molecule (12,13).

In dogs, the rate of ethanol detoxification ranges from 150–200 mg/kg/h (4).

Treatment of ethanol toxicosis is largely supportive. The induction of emesis and use of activated charcoal is indicated if it is within two hours of known ingestion and if there is no marked CNS depression (4). Maintenance of fluid balance, body temperature, and ventilation are all important therapeutic principles in handling the intoxicated dog. Tracheal intubation (3), naloxone (4), and doxapram (6) have been utilized in past cases to assist with ventilation in animals with respiratory compromise. The occasional animal with ethanol toxicosis may require therapy for hypoglycemia and metabolic acidosis (4).

As with any poisoning, prevention is the treatment of choice. Owners must be made aware of the danger and consequences of alcohol consumption in the family pet and consider alcohol as a household poison. Veterinarians are reminded that any incident of alcohol poisoning in animals is not legally privileged information and, if abuse is thought to have occurred, the local humane society and police may need to be involved.

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## References

1. Ratcliff RC, Zuber RM. Acute ethyl alcohol poisoning in dogs. *Aust Vet J* 1977; 53: 48–49.
2. Valentine WM. Short-chain alcohols. *Vet Clin North Am* 1990; 20: 515–523.
3. Mount ME. Toxicology. In: Ettinger SJ, ed. *Textbook of Veterinary Internal Medicine*. Philadelphia: WB Saunders, 1989: 456–483.
4. Coppock RW, Mostrom MS, Lillie LE. Ethanol and illicit drugs of abuse. In: Kirk RW, ed. *Current Veterinary Therapy X*. Philadelphia: WB Saunders, 1989: 171–177.
5. Thrall MA, Freemyer FG, Hamar DW, Jones RL. Ethanol toxicosis secondary to sourdough ingestion in a dog. *J Am Vet Med Assoc* 1984; 184: 1513–1514.
6. Mar ED. Apparent ethanol poisoning in puppies shampooed in dishwashing detergent. *Vet Med* 1984; 79: 318–320.
7. Papich MG. Toxicoses from over-the-counter human drugs. *Vet Clin North Am* 1990; 20: 431–451.
8. Du Jardin - Beaumetz. *Acad Sci* 1875; 81: 192. Cited by Ratcliff RC, Zuber RM. Acute ethyl alcohol poisoning in dogs. *Aust Vet J* 1977; 53: 48–49.
9. Merck and Company. *The Merck Index* 10th ed. Rahway, New Jersey: Merck and Company Ltd, 1983: 34–35.
10. Clarke EGC, Clarke ML. *Veterinary Toxicology*. London: Baillière Tindall, 1975: 244–245.
11. Messiha FS. Cholinergic, anticholinergic agents and ethanol interaction. *Vet Hum Toxicol* 1990; 32: 120–124.
12. David DJ, Spyker DA. The acute toxicity of ethanol: dosage and kinetic nomograms. *Vet Hum Toxicol* 1979; 21: 272–276.
13. Hawkins RD, Kalant H. The metabolism of ethanol and its metabolic effects. *Pharmacol Rev* 1972; 24: 67–157.

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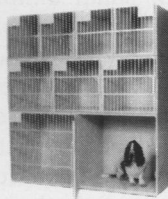
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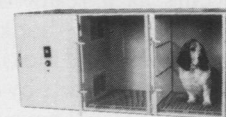
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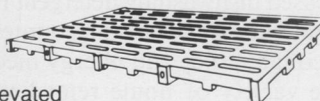
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