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FLUOROSIS IN DOGS - A REVIEW

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ABSTRACT: Fluoride is a naturally occurring chemical found in untreated water sources and a synthetic version of it is used as an additive in water supplies in many towns and cities. Although it is an effective way to prevent cavities, in large doses it can become toxic. Severe poisoning can occur if your dog eats something with a very large amount of fluoride such as toothpaste. This generally begins with the inflammation of the stomach and intestines followed by an increased heart rate with abnormalities. The fluoride is absorbed into the system within 90 minutes and will generally result in collapse and death within a few hours if it is untreated. Chronic overexposure to fluoride can result in weakened bones or abnormal bone growths as well as chronic gastric disorders.

Fluoride is a naturally occurring chemical that canines can be particularly sensitive to. Fluoride toxicity due to overexposure is extremely serious and it can be acute or chronic.

KEYWORDS-fluoride,dogs,exposure,chronic,acute,weakened,bones,toxicity,fluorosis

I. INTRODUCTION

Symptoms of Fluoride Poisoning in Dogs

Some of the symptoms of fluoride toxicity such as lameness or muscle wasting are only likely to be seen when the exposure to higher than normal levels of fluoride has been chronic.

- Depression
- Diarrhea
- Excessive drooling
- Gastroenteritis
- Labored breathing
- Lameness
- Lethargy
- Loss of appetite
- Muscle wasting
- Muscle weakness
- Rapid heart rate
- Restlessness
- Seizures
- Stiffness
- Sudden death
- Sweating
- Vomiting
- Weight loss

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Types

Calcium fluoride

- This is the variety of fluoride that is found most often in nature
- A fluoride molecule bonds with a calcium molecule to create calcium fluoride
- Although calcium fluoride is more easily tolerated by the body than synthetic fluorides, it can be just as lethal at high doses

Sodium fluoride

- This is the first synthetic fluoride that was introduced to the water supply
- It is a white, odorless additive which has to be dissolved before adding it to the water supply

Sodium fluorosilicate

- A dry additive which has to be dissolved before adding it to the water supply. This is fluorosilicate acid bound with sodium giving it a powdered or crystallized structure making it much easier to ship

Fluorosilicic acid

- An inexpensive by-product of phosphate fertilizer manufacture in liquid form, also known as hydrofluorosilicate, HFS, or FSA. It is more commonly used, but can be quite expensive to ship

Causes of Fluoride Poisoning in Dogs

Significant sources of fluoride for your canine:

Dog food

- Some dog foods have a high amount of fluoride in their make up
- Foods with large amounts of bone meal are more likely to have high fluoride levels due to the tendency for fluoride to accumulate in the bones

Fluoridated dental products

- Fluoride is added into most toothpastes and gel treatments for humans
- Due to the canine sensitivity to fluoride, it is rarely added to toothpastes designed for dogs
- Human dental products may also contain xylitol, which is extremely toxic to canines

People food

- Some food that people eat have higher concentrations of fluoride than others
- Foods with notable amounts of fluoride can include cucumbers, pickles, spinach and canned tomato products

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Water supply

- Supplemental fluoride is added to the water supply in most areas in the US, and some water supplies have naturally high fluoride levels

Diagnosis of Fluoride Poisoning in Dogs

If it is a reaction to a single large dose and you have any of the remaining product or package, you will want to bring that with you to the clinic as well. Your veterinarian will need to get a full history from you, taking special note of the diet and any opportunistic eating as well as a progression of symptoms. That information, combined with a physical examination will help reach a conclusive diagnosis. The physical examination will check for inflammation, and will take particular note of any heart rhythm abnormalities. There are several disorders which may mimic chronic fluoride overexposure. A complete blood count, biochemistry profile, and urinalysis are likely to be done at this time as well to rule out other disorders with the same symptoms, as well as detect any toxins in the system. Fluoride usually does not remain in the body longer than 24 hours so this method of detection may provide a false negative.

Treatment of Fluoride Poisoning in Dogs

An acute case of fluoride poisoning can kill within just a few hours time so time is of the essence if the disorder is to be corrected. If you know what your pet ingested contact the veterinarian immediately. If ingested recently enough, your veterinarian may opt to have you induce your dog to vomit to avoid the absorption of any toxins before travelling to the office. Patients that develop acute fluoride poisoning can be given calcium gluconate intravenously and magnesium hydroxide or milk by mouth to minimize absorption, although this is not always successful and the patient may ultimately succumb to the imbalance. Chronic fluoride poisoning also has a poor prognosis, and once the outward signs have developed reversal is unlikely. Your veterinarian may be able to recommend a low fluoride dog food and specific supplements may be added to your pet's diet to reduce the absorption of the fluoride. These measures will not reverse or stop the progression of the disorder but it may slow the development of additional symptoms for a time.

Recovery of Fluoride Poisoning in Dogs

Keeping the recovering patient in a quiet and calm environment and making sure that he or she completes the full measure of any prescribed medications will help encourage recovery. Medications to guard against secondary infection or to protect the gastrointestinal system may be recommended. In order to reduce the symptoms and slow the progression of the disorder, the patient may need to be placed on a diet restricted to low-fat, high-fiber foods until any inflammation has gone down. In the case of chronic fluoride poisoning it is essential to track down and eliminate the source of the overabundance of fluoride in the diet or environment of the animal.

II. DISCUSSION

Fluoride Is A Neurotoxin

If you want to know the answer to the question, is fluoride bad for dogs? ... there's a 2014 research study published in one of the world's most distinguished medical journals, The Lancet, that classified fluoride as a dangerous neurotoxin (1). The same study placed fluoride in the same category as other known toxins, like arsenic, lead and mercury.

The study showed that children exposed to fluoride in drinking water at levels of less than 4 milligrams per liter (the allowed level in US water), found an average 7 point decrease in the IQs of these children (2).

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Just 7 points may not seem like much. But it's enough to make the researchers worried that fluoride could be causing neurodevelopment disabilities. These include conditions like ADHD, dyslexia and other cognitive disorders, which affect millions of children.

The report highlights "very great concern that children worldwide are being exposed to unrecognized toxic chemicals that are silently eroding intelligence." The researchers were so worried about these dangers that they called for "all chemicals in existing use and all new chemicals" to be tested for developmental toxicity.

The EPA also warns that "adults exposed to excessive consumption of fluoride over a lifetime may have increased likelihood of bone fractures, and may result in effects on bone leading to pain and tenderness."

If fluoride causes cognitive issues in children and bone weakness in adults, it almost certainly does in dogs too. In fact, it's likely dogs suffer even more ill effects from fluoride than people do, and not just neurological development issues. And the worst part is ... fluoride is very hard to avoid.

Fluoride Toxicity In Dogs

There are two major ways that fluoride gets into your dog.

#! Fluoride In Your Dog's Water

Fluoride is added to many city water supplies to help prevent tooth decay.

Legal Limits On Fluoride In the US
In 2013, the US Public Health Services formalized its recommendation for an optimal fluoride concentration of 0.7 milligrams/liter. But this is a recommendation, not an enforceable regulation. The PHS says this level provides enough fluoride to prevent tooth decay in children and adults while limiting the risk of dental fluorosis (which they claim is "the only unwanted health effect of community water fluoridation") (3)

Since January 2011, the EPA's maximum allowed level of fluoride in US public water systems is 4.0 mg/L. The US EPA has a secondary non-enforceable standard of 2.0 mg/L, to protect children against the dental fluorosis – the tooth discoloration and/or pitting that can be caused by excess fluoride exposures during the formative period before adult teeth appear. This means public water authorities must notify the public if the levels exceed the secondary standard.

Some private well water may even contain fluoride as it's naturally present in most water. Bottled water is also allowed to contain fluoride, and is currently limited to 0.7 mg per liter. But there's no requirement to disclose this on the label, so you have to contact the manufacturer to find out.

Fluoride In Canadian Water
In Canada, the limit for fluoride in drinking water is a Maximum Acceptable Concentration of 1.5 mg/L. The government reports that in 2005 community fluoridated drinking water was supplied to 43% of Canadians. Fluoride is also found in some groundwater sources. Municipalities can use various techniques to lower the levels of fluoride. With private water supply, they advise homeowners to use reverse osmosis or distillation systems.

Other Countries
Most European countries have stopped adding fluoride to drinking water because of its toxic properties. As of May 2011, 97% of the Western European population has non-fluoridated water.

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In some countries like China, India and parts of Africa, the water has high natural fluoride levels. In these countries, they're removing the fluoride from the water supply.

But in the US, fluoride is still added to drinking water ... it's estimated that 3 in 4 Americans are drinking fluoridated water... which probably means 3 in 4 dogs are drinking fluoride too.

Not only that, but it's absorbed through the skin as well, so every time you bathe your dog or let him swim in your pool, he's likely being exposed to unsafe levels of neurotoxic fluoride. And there are other ways your dog is getting too much fluoride ...

#2 Fluoride In Dog Food

Because fluoride is added to drinking water, it infiltrates everything. Plants, processed foods and feed animals all accumulate fluoride until the safe levels in the drinking water are blown away. This is especially true for kibble and processed foods.

Independent studies, including those done by the Environmental Working Group (EWG), show that many processed dog foods have excessive levels of fluoride that are as much as 2.5 times higher than "safe" levels. The EWG's report notes fluoride's link to neurotoxicity, hormonal disruption and bone cancer. They conclude,

"This high level of fluoride exposure may well be a contributing factor to osteosarcoma in dogs.

Most of the fluoride in pet food comes from ...

- Chicken byproduct meal
- Poultry byproduct meal
- Meat meal
- Meat and bone meal
- Animal digest
- Chicken meal

If you feed a commercial dog food, check the labels for these ingredients and avoid them. But keep in mind fluoridated water is also added to the food during processing.

If you brush your dog's teeth, you'll also want to check his toothpaste ingredients to make sure there's no fluoride; it's present in some pet toothpaste brands. Here's some information about natural toothpaste and DIY options for dogs. (You may want to check out the warning labels on your own toothpaste too.)

Risks Of Fluoride Toxicity

One of the main risks of too much fluoride is a disease called skeletal fluorosis.

Skeletal fluorosis is a painful, debilitating disease caused by a buildup of fluoride in the body. This disease is often misdiagnosed, even in later stages of the disease, as the symptoms mimic those of other diseases.

Since fluoride's effects are cumulative, it's easy to mistake fluorosis for arthritis symptoms. Xrays only show the more advanced stages of the disease and completely miss the early stages. Early stage symptoms of fluorosis include stiffness and painful joints and may just be dismissed as your dog's normal aging process or a bit of arthritis.

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More advanced stages of the disease can also be misdiagnosed as conditions like spondylosis or renal osteodystrophy (abnormal bone growth the results from kidney disease).

It's widely thought that skeletal fluorosis is not an issue in North America ... but in reality, early onset is possibly rampant and either misdiagnosed or missed completely.

Other Fluoride Risks

New studies have ironically linked dental disease to fluoride. So the substance that's intended to prevent tooth decay is damaging teeth in other ways.

Fluoride can also cause ...

- Weakening of bones
- Bone loss
- Bone cancer (especially osteosarcoma)

And research also shows that fluoride can affect kidney and endocrine health.

- Kidney disease (4)
- Hypothyroidism (5, 6, 7)

Gastrointestinal upset has also been linked to fluoride.

It's possible that fluoride increases your dog's risk of getting osteosarcoma. Several studies have found that boys who drink fluoridated tap water between the ages of six and eight have an increased risk of osteosarcoma, and dogs may be even more susceptible to this deadly disease.

Consider the numbers: more than 10,000 osteosarcoma cases occur in US dogs each year (and this number may be understated as not all cases are confirmed and registered). This is over 10 times higher than osteosarcoma cases in the US human population, which are less than 1,000 a year.

Why is it so much higher in dogs? Could it be because they're consuming a lot of extra fluoride through their food — and eating the same food every single day, compared to humans who eat a much wider variety of foods? The damage from excessive fluoride is cumulative and for the most part, irreversible.

Avoid Fluoride For Dogs

While some symptoms can be treated, the safest approach is to make sure your dog gets as little fluoride as possible.

- Don't feed processed foods like kibble or canned foods, and if you do, make sure they don't contain ingredients like chicken byproduct meal, chicken meal or other meat meals, animal digest, and bone meal.
- If you feed your dog a raw diet, buy the best ingredients you can afford. Try to get pastured, free-range (non-factory-farmed) meats, and buy organic veggies and fruits.
- Find out whether your municipal water or your well water contains fluoride. If it does, give your dog filtered drinking water, and make sure the filter you buy does filter out fluoride, as many (including Brita brand filters) don't. Most reverse osmosis filters are effective against fluoride.
- Some bottled water may also contain fluoride, but the FDA doesn't require companies to disclose it on the label. So the only way to find out is to contact the manufacturer.

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How To Detox Fluoride From Your Dog

Here are some ways to help remove fluoride from your dog's body.

Feed Kelp

Iodine can help detoxify fluoride accumulation, so adding kelp to your dog's diet is a good idea. Make sure you buy kelp from a reputable manufacturer who tests their kelp for purity. Kelp sourced from Nova Scotia, Iceland and New Zealand is generally considered best because those waters are less polluted.

Give about ¼ tsp per 10 lbs of body weight per day.

Give Chlorella

Chlorella is known for its ability to bind toxins and help remove them from the body.

Start out slowly and build up to 1 gram of chlorella daily for small dogs and up to 3 grams for larger dogs.

Other herbs said to help remove fluoride from the body include ...

- Turmeric/curcumin
- Cayenne (not too much – it's very spicy)
- Parsley
- Cilantro

Even though fluoride is nearly impossible to avoid, these foods may help detoxify your dog and keep him safe from fluoride-related diseases.

III. RESULTS

The fluoride in human toothpaste can make your dog sick. Not only that, but some toothpaste contains xylitol, an artificial sweetener that can make your dog sick.

How does this relate to reality? Because usually, when a person's dog eats something, they can be kind of anxious, which makes math is hard to do. So, here is what you need to know:

Fluoride

Too much fluoride will give your dog digestive issues. Our water in the Valley is fluoridated. Many dog food brands also contain fluoride. So, using fluoride toothpaste (even if it doesn't contain xylitol) is not healthy for your dog. Also, some people's dogs have a propensity for chewing things up. If their adventures take them to the countertop where the tube of fluoride toothpaste was left, they can chew up the tube, and that will poison them.

Xylitol

50 milligrams per pound of the dog's body weight is enough to cause hypoglycemia and liver failure in a dog. But, since we're Americans, it's tough to do a quick conversion, so maybe it will help to know there are 500 milligrams in one teaspoon. So, if you have a ten-pound dog, one teaspoon of xylitol is enough to poison him. Since each toothpaste is different, it's hard to know how much xylitol is in it.

But wait--When fluoride is safe for dogs?

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Just like their child counterparts, young puppies can benefit from a topical fluoride application provided by a veterinary in a controlled environment.

As with many things, when a professional veterinarian applies fluoride at the right time of a dog's life, it's a good thing. When it's ingested because the dog grabbed it off the bathroom counter, it means your family vet is going to get a call. The most important thing a family can do concerning fluoride and dogs

- Never use human toothpaste on your dog. There are special dog toothbrushes and dog toothpaste.
- Do not let your dog grab your toothpaste, mouthwash, or gum containing fluoride or xylitol.
- If your dog gets into the family toothpaste, grab the box with the ingredients on it and call your family vet.

We love our pets, and we love taking care of them. If you take care of your dog's teeth, you may be surprised to know that it can keep him from getting the same kinds of ailments humans can get from dental problems: decay, halitosis, infections and heart ailments. Remember that next time you use dog toothpaste to brush those 42 teeth in the mouth of your favorite pal.

IV. CONCLUSIONS

The effect of tamarind ingestion on fluoride retention was studied in three groups of dogs - control (Group I), fluoride-supplemented (Group II), and fluoride and tamarind-supplemented diets (Group III). The urinary excretion of fluoride was significantly higher in Group II (2.45 ± 0.39 mg F/day) and Group III (3.78 ± 0.35 mg F/day) as compared to Group I (0.205 ± 0.21 mgF/ day). The difference between Group II and III was also significant. The femur fluoride content of Group II animals (4.0 ± 0.67 mg F/gm ash) was significantly higher as compared to that of Group III (2.0 ± 0.52 mg F/gm ash) suggesting a beneficial effect of tamarind ingestion on fluoride retention and toxicity. There were no significant differences in hematological parameters between the groups, although hemoglobin levels and packed cell volume tended to be lower in Group III as compared to Group I. Histopathological study showed that except in kidneys where congestion and tubular changes were greater in experimental groups as compared to control, all other organs were comparable between the groups.

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