

Natural Approaches for Flea Control

The perceived toxicity of conventional veterinary flea-control products makes “natural” alternatives attractive options among consumers, based on the assumption that they latter are less hazardous for the animal receiving treatment and others in the household who are exposed to the animal. Unfortunately, certain natural flea control options may pose more dangers than conventional products, and offer less effectiveness. As stewards of animal and public health, veterinarians have a responsibility to inform their clients of the potential hazards of both natural and synthetic flea control products. Learning about the dangers of natural approaches can be challenging, though, since books and Internet sites espousing natural healthcare for animals rarely address animal and public health hazards adequately.

Natural approaches for fleas fall into three main categories: dietary, topical, and environmental. Dietary management (e.g., adding brewer’s yeast and garlic to the animal’s diet) has the least evidence of efficacy for flea control. In one study on brewer’s yeast, dogs received fourteen grams daily for five weeks with no effect.¹ Garlic causes Heinz body anemia and “should not be fed to dogs”.²

Topical products for natural flea control routinely contain essential oils (EOs), which are highly concentrated botanical compounds. Both sassafras oil and pennyroyal oil have proven efficacy against *Diagnosis montanus*, a ground squirrel flea.³ Pre-formulated EO combinations and recipes are readily available for dog and cat flea control and touted as safe. However, essential oils applied to the skin can cause contact dermatitis and allergic reactions; topical pennyroyal oil can be deadly to animals. Oral administration heightens the risk of toxicity; obviously, topically applied EOs become orally ingested as the animal self-cleans the fur following administration. EOs may contain salicylates, obviating their usage in cats. Certain EOs (eucalyptus, pennyroyal, wormwood, camphor, fennel, hyssop, sage, savin, tansy, thuja, rosemary, and pine) can be epileptogenic;⁴ several of the aforementioned group are common insect repellants. The danger of EOs causing seizures is higher for pediatric and epileptic populations, but any first seizure of unknown etiology, or a worsening epileptic condition should prompt clinicians to inquire about EO usage.

¹ Baker NF and Farver TB. Failure of brewer’s yeast as a repellent to fleas on dogs. *JAVMA*. 1983;183(2):212-214.

² Lee K-W et al. Hematologic changes associated with the appearance of eccentrocytes after intragastric administration of garlic extract to dogs. *AJVR*. 2000;61(11):1446-1450.

³ Rutledge LC et al. Tests of repellants against *Diagnosis montanus* (Siphonaptera: Ceratophyllidae). *J Med Entomol*. 1982;19(4):361-365.

⁴ Burkhard PR et al. Plant-induced seizures: reappearance of an old problem. *J Neurol*. 1999;246:667-670.

Pennyroyal oil poses the most clearly defined and well-documented risk to animals and humans from EOs. Pennyroyal is “an herbal toxin of public health importance”; ingestion of a small amount of the oil, or even a tea made from pennyroyal leaves, has caused several deaths.^{5, 6} Serious hepatic and neurologic injury are the major features of pennyroyal oil toxicity. Clinical signs of exposure in humans and animals include nausea, vomiting, respiratory difficulty, gastrointestinal bleeding, seizures, and coma, followed by coagulation abnormalities, disseminated intravascular coagulation, massive hepatic necrosis, and death. A 1992 case report of pennyroyal toxicosis in a dog describes the case of a seven year-old, thirty kg female mixed-breed dog, treated topically for fleas with sixty milliliters of 100% pennyroyal oil, obtained from a local health food store. Less than one hour after application, dog became listless. After two hours, vomiting began. Within thirty hours, diarrhea, hemoptysis, epistaxis, lethargy developed. Following admission to the veterinary hospital, the dog developed seizures and died, despite supportive measures.⁷

A less toxic topical flea control option comes from the neem seed, which has a long history of use for insect control in India and elsewhere. Neem seed extracts contain azadirachtin, which reduces flea counts in a dose-dependent manner. According to one study, researchers noted an immediate, near-total reduction in fleas in dogs and cats after topical application of a mist-spray, with substantial reductions continuing for up to 19 days.⁸ Exposure to neem extracts is not without risk, however. There are reports of toxic encephalopathy in infants and young children following oral ingestion.⁹ Animal studies found dose-related impairment of thyroid function and hepatotoxicity.¹⁰

Environmental flea-control applications include diatomaceous earth, pyrethrins, and boric acid. Precautions for diatomaceous earth usually revolve around limiting dust inhalation. Pyrethrins in microencapsulated preparations have enhanced effectiveness over unencapsulated pyrethrins, along with a longer sustainability in the environment.¹¹ Exposure to pyrethrins can cause dermal and respiratory irritation and sensitization that can lead to contact dermatitis and asthma.¹²

⁵ Bakerink JA et al. Multiple organ failure after ingestion of pennyroyal oil from herbal tea in two infants. *Pediatrics*. 1996;98(5):944-947.

⁶ Anderson IB et al. Pennyroyal toxicity: measurement of toxic metabolite levels in two cases and review of the literature. *Ann Intern Med*. 1996;124:726-734.

⁷ Sudekum M et al. Pennyroyal oil toxicosis in a dog. *JAVMA*. 1992;200(6):817-818.

⁸ Guerrini VH and Kriticos CM. Effects of azadirachtin on *Ctenocephalides felis* in the dog and the cat. *Veterinary Parasitology*. 1998;74:289-297.

⁹ Lai SM et al. Margosa oil poisoning as a cause of toxic encephalopathy. *Singapore Medical Journal*. 1990;31(5):463-465.

¹⁰ Panda S and A Kar. How safe is neem extract with respect to thyroid function in male mice? *Pharmacological Research*. 2000;41(4):419-422.

¹¹ Bennet GW and Lund RD. Evaluation of encapsulated pyrethrins (Sectrol™) for German cockroach and cat flea control.

¹² CDC. Illnesses associated with occupational use of flea-control products – California, Texas, and Washington, 1989-1997. *MMWR*. 1999;48:443-447.

Boron compounds have been described as “fairly effective and very safe” for flea control in dogs and cats, particularly if exposure is kept to a minimum.¹³ Fatalities from exposure to boric acid were regularly reported half a century ago, “in spite of repeated warnings as to the careless use of boric acid”.¹⁴ Now, the rising popularity of boric acid as a household insecticide is causing increasing concern among human pediatricians.¹⁵ Boric acid readily penetrates damaged skin; animals and humans with inflammatory or damaged skin are therefore more at risk. Absorption is complete and rapid following oral ingestion. The highest concentrations occur in brain and liver. Early intoxication signs resemble acute gastroenteritis, with diarrhea, vomiting, possibly dehydration and lethargy. Initial central nervous system excitation (hypertonia, hyperreflexia, seizures, agitation) may lead to coma in severe overdose. A rash commonly develops, followed by desquamation in two to three days. The lethal dose for newborns is one to three grams; for infants, it is five grams; for adults, fifteen to twenty grams.

The Toxic Exposure Surveillance System, maintained by the American Association of Poison Control Centers, and certain state-based pesticide poisoning surveillance systems are improving the tracking of illnesses associated with flea-product applications.¹⁶ However, the lack of recognition by health-care professionals of pesticide-related illness and injury deters surveillance and delays proper treatment. Heightened awareness and precautionary steps taken by veterinarians and their staff can help reduce toxic exposure to workers, clients, and animals from either natural or synthetic products. In summary, consideration regarding the public health hazards, the need for frequent re-application, and the reduced effectiveness compared to conventional flea-control products are important topics for discussion between veterinarians and their clients.

¹³ Hamilton D. Homeopathic care for cats and dogs. Berkeley: North Atlantic Books, 1999, p. 327.

¹⁴ Abramson H. Fatal boric acid poisoning in a newborn infant. *Pediatrics*. 1949;4(6):719-722.

¹⁵ Siegel E and Wason S. Boric acid toxicity. *Pediatric Toxicology*. 1986;33(2):363-367.

¹⁶ CDC. Illnesses associated with occupational use of flea-control products – California, Texas, and Washington, 1989-1997. *Morbidity and Mortality Weekly Report*. 1999;48(21):443-447.