

Review Article

Chronic Diarrhea in Dogs: What Do We Actually Know About It?

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A B S T R A C T

There is a paucity of research based knowledge about chronic diarrhoea in dogs. In the literature no studies can be found that confirms that round worm, whip worm, hook worm or giardia cause chronic diarrhoea in dogs. For this reason, it is questionable to study endoparasites when clarifying the reason for chronic diarrhoea in dogs. No study confirms that clostridium-, campylobacter- or salmonella species cause chronic diarrhoea signs in dogs. There is no research-based information to-date that endoscopy would be helpful in the diagnosis of dogs with chronic diarrhoea or to monitor how the disease progresses. Neither no reliable laboratory test can be recommended to be used in evaluating the seriousness of the disease or to monitor the progress of the disease. There is no evidence based information on what food should be recommended for dogs suffering from diarrhoea. Only a few studies have been published that show how effective antibiotics are in the treatment of diarrhoeal dogs. Many more studies are needed before it is possible to determine how effective corticosteroids are in the treatment of diarrhoea in dogs.

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In recent years, a lot of scientific articles and books on gastroenterology in dogs and cats have been published. When the keywords *diarrhea* or *diarrhoea* and *dog* or *canine* are used in PubMed one can get more than 1800 hits. Washabau and Day¹ published the book *Canine and feline gastroenterology* that comprised 1000 pages. Five years earlier Steiner² published somewhat smaller text less than 350 pages *Small animal gastroenterology* as a reference book. In addition, The Veterinary Clinics of North America have published many books on the subject of gastroenterology.³⁻⁵ All of these books have hundreds of pages about diarrhea in dogs, so there is enough reading for all who are interested in dogs with chronic diarrhea. When reading these books and articles, however, it has been difficult to know how much of this information is actually based on solid research, and how much is based on common beliefs, or speculations.

When reading the articles and textbooks dealing with diarrhea, it is important to pay attention to where the information had been gathered or how the studies had been performed. For example, how to use data to give advice about treating a dog with chronic diarrhea. If the recommendations are based on in vitro studies, the results are of low practical value. Results obtained from studies on experimental animals of other species also often have minimal importance. The same goes for a variety of opinions and ideas that are not based on any studies. Results obtained from case studies can be important, particularly, if they include observations on multiple patients. Information can be considered as being most reliable when obtained from a randomized control study. Such is the case when efficacies of 2 medications are compared in patients randomly assigned to the treatment groups. However, even these studies do not rule out the possibility that the elimination of the signs of diarrhea should be coincidental. The results should be

confirmed by a placebo-controlled study whereby one subgroup of the dogs with diarrhea are treated with the drug and the other receive a placebo treatment. The strongest evidence would be obtained by employing randomized double-blind studies.

The easiest solution to perform clinical studies would be to use experimental dogs with chronic diarrhea. Such experimental kennels are, however, exceptionally rare. Monkeys frequently have diarrhea when they live in captivity. In 1 macaques kennel comprising several hundred monkeys, about every second monkey had chronic diarrhea of unknown etiology. In this kennel, several double-blinded placebo-controlled studies have been performed to clarify which of the currently used antidiarrhoeal agents work best.⁶

When performing placebo-controlled studies on patients with chronic diarrhea one has to take into account at least the following considerations. It is important that the treated and placebo-treated dogs have starting points that are as similar as possible. However, this is difficult to achieve. Both groups of dogs should have long lasting and intense signs of diarrhea. It is also important that the cooperation with the owners of the dogs is very close, so owners should be thoroughly informed about the research process carefully. Owners should live close to the research center to avoid the communication problems. It is also recommended that there is only 1 research center and only a few veterinarians perform the study. The study period should not be very long, because the owners are unwilling to have a dog with diarrhea at home for a prolonged period of time. Chronic diarrhea in dogs is often intermittent so the signs may spontaneously disappear for some time without any treatment. That is why in the double-blinded studies the signs of diarrhea may disappear even with the placebo treatment.

Examination of a Dog With Chronic Diarrhea

The studies with patients with chronic diarrhea usually begin with the initial examination. The main purpose of the examination

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The work has been performed in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans and EU Directive 2010/63/EU for animal experiments.

is to determine whether the diarrhea signs are caused by some nonintestinal disease. When Kilpinen et al⁷ made the placebo-controlled, double-blinded study considering the effect of tylosin in treatment of chronic diarrhea they included to the initial examination blood, urine and stool samples, and endoscopy examination. The aim was to study dogs suffering from idiopathic diarrhea; therefore, they decided to exclude the dogs with strong evidence that the signs of diarrhea were caused by some non-intestinal disease. Although the initial examination revealed that some dogs had a variety of abnormal findings they decided to exclude only the dogs that were suffering from exocrine pancreatic insufficiency (EPI). The most comprehensive study, which shows that EPI causes diarrhea signs, is the study by Rähkä et al.⁸

Reference books that deal with gastroenterology very often recommend that when the nonintestinal so-called secondary causes of diarrhea have been excluded from the study, one should also remove the dogs, with endoparasites and enteropathogenic bacteria in stool samples. Only then could the treatment trials be started with dogs with idiopathic diarrhea.

The Role of Endoparasites Causing Signs of Diarrhea in Dog

The endoparasites of dogs are mentioned in very general terms in gastroenterology textbooks and reference works, for example, nematodes, hookworms, and whipworms may cause chronic diarrhea in dogs. However, no further details are given, and there are no references.

When typing the keywords *Toxocara canis* in the PubMed, it is possible to obtain 1700 studies. In the literature, one can find a very large number of studies, in which the morphology of this nematode is described and how the parasite can be diagnosed. The prevalence of the parasite in different countries is also known. We also have information that the intestinal parasite is found both in asymptomatic dogs and in dogs with diarrhea. There is also a lot of information on how to treat these dogs effectively. When the keywords *T. canis infection* is typed in, one can obtain 737 studies. Virtually all of the studies deal with the presence of *T. canis* infection in humans and how it causes eye, heart, and allergy symptoms, especially in children. A combination of the keywords *T. canis* and *diarrhea* produced hits for 14 articles in the search. Most of the studies compared the prevalence of the endoparasite in healthy dogs and dogs with diarrhea. There was no attempt in any study to examine if the endoparasite was actually causing diarrhea signs. In other words, there was no study where the dogs with diarrhea had been wormed and then followed-up to ascertain if, the signs of diarrhea had disappeared after treatment. Similarly, no trial could be found in which the dogs had been fed a diet to which *Toxocara* had been added and then followed-up to ascertain whether the signs of diarrhea appeared.

By typing in the keyword whipworm *Trichuris vulpis* in PubMed, one obtain 2671 publications. With the keyword *Trichuris* and *diarrhea*, there were 1471 studies; and with the keywords *Trichuris* and *diarrhea* and *dog*, there were hits for 7 studies. However, none of these studies dealt with diarrhea in dogs. In the textbooks, however, there is a large number of texts about whipworms. For example, Leib⁹ wrote in Steiner's book that *T. vulpis* infection is one of the most common causes of acute or chronic large bowel diarrhea in dogs. This statement is followed by 2 references. The first is Leib's own publication from 1997, which contains the same statement, albeit without references.¹⁰ The second reference is Leib's article published in 1991, where he reported that *Trichuris* causes diarrhea in dogs, but he did not indicate how to justify this finding.¹¹ In Steiner's book, as in a number of other textbooks the signs of *T. vulpis* are described as follows: diarrhea with hematochezia and excess mucus occurs

frequently. Abdominal pain vomiting, inappetence, and weight loss can also be observed. The diarrhea may be intermittent in chronic cases. Anemia can result in pale mucous membranes and lethargy. The reference is an article, which mainly reports the prevalence of whipworms in dogs in the United States of America.¹²

The most common hookworm in dogs is *Uncinaria Stenocephala*. When using the keyword *Uncinaria* and *dog*, it would reveal 88 articles that principally deal with the hookworm prevalence in different countries or describe the efficacy of treatment drugs for the endoparasite. Hookworms are known to cause anemia in puppies, but none of the articles stated that hookworms cause diarrhea in dogs.

In summary, no studies in the literature can be found that confirms that roundworm, whipworm, and hookworms cause chronic diarrhea in dogs. For this reason, it is questionable to study endoparasites when clarifying the reason for chronic diarrhea in dogs.

Giardia species causes giardiasis in several million humans every year. Giardiasis causes acute or chronic diarrhea, dehydration, abdominal pain, and weight loss in humans. This protozoon is also found in dogs and cats as a subclinical infection; though according to the textbooks, it can also cause the same kind of signs as in human. After the statement, however, no references are given in these texts. *Giardia* is quite commonly found in dogs throughout the world, and there are number of ways to diagnose and treat it. When trying to seek research studies that had investigated diarrhea caused by giardia in PubMed, one obtains 40 articles after entering the keywords *giardia* and *diarrhea* and *dog*. In most of these studies, giardia was found to occur frequently in puppies with diarrhea. A few years ago, a study on more than 8000 dogs with diarrhea from several European countries was published.¹³ The study reported that nearly 25% of the dogs had giardia. Unfortunately, in this study it was not stated whether the dogs had been treated against giardia, and if they had been treated whether the diarrhea signs disappeared. No reports were found where dogs with diarrhea and giardia were treated and then studied whether the diarrhea signs had resolved and no giardia were found from the fecal samples. Similarly, no studies were found in which dogs were fed giardia. The conclusion is that no studies demonstrating that giardia causes chronic diarrhea signs in dogs have been published.

Do Enteropathogenic Bacteria Cause Diarrhea Signs in Dog?

Recently, numerous studies have been published that attempted to identify the composition of the intestinal bacterial flora and their importance to the welfare of the dog. New molecular methods have been essential in these studies. Although progress has been made, there are still difficulties in distinguishing between normal and abnormal bacterial flora of each other.

It has been shown that several enteropathogenic bacteria cause diarrhea in humans, and it is suspected that the bacteria also cause diarrhea in dogs. The importance of enteropathogenic bacteria in causing signs of diarrhea in dogs is a confusing topic in textbooks and reference books. The best summary of the present state of knowledge is presented by Weese.¹⁴ The article by Marks and Kather¹⁵ previously published by the same body in 2003 is also comprehensive. In his article, Weese details the enteropathogenic bacteria, and the present opinion article is largely based on his text. Weese mentions that diagnosing bacterial enteritis in the dog is, at best, an inexact science. Marks and Kather state that there is no universal consensus between veterinary diagnostic laboratories about which bacterial species should be evaluated or which diagnostic assays should be used. In addition, sensitivity and specificities of commercial toxin assays commonly used in the

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