

Clinical and therapeutic aspects of canine giardiasis - a report of three cases

Aspectos clínicos e terapêuticos da giardíase canina - relato de três casos

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RESUMO

A *Giardia* spp. é um protozoário flagelado que causa a giardíase, uma zoonose de notificação não obrigatória no Brasil, afetando animais domésticos, silvestres e humanos. A transmissão ocorre principalmente pela ingestão de água ou alimentos contaminados com cistos do parasito. Devido à sua recorrência e às implicações em problemas de saúde pública em nível mundial, este trabalho tem como objetivo relatar aspectos clínicos e terapêuticos da giardíase canina em três cães naturalmente infectados no estado de Sergipe, Nordeste do Brasil. Foram atendidos pela equipe do Laboratório de Doenças Parasitárias dos Animais da Universidade Federal de Sergipe, campus do Sertão, três cães adultos, com histórico de quadro de gastroenterite aguda. Ao exame físico alguns dos sinais clínicos observados foram anorexia, desidratação, mucosas hipocoradas, congestão ocular, além da presença de carrapatos sob a pelagem. Nos resultados do exame hematológico foi revelada presença de anemia e leucopenia, enquanto o parasitológico de fezes identificou a presença de *Giardia* spp. Como tratamento terapêutico, foi adotado protocolo giardicida associado a suplementação probiótica e vitamínica, além de orientações profiláticas para auxiliar no controle do parasito e na redução da contaminação ambiental.

Palavras-chave: Canino, Gastroenterite, Tratamento.

ABSTRACT

Giardia spp. is a flagellated protozoan that causes giardiasis, a non-mandatory notifiable zoonotic disease in Brazil, affecting domestic, wild animals, and humans. Transmission primarily occurs through the ingestion of water or food contaminated with the parasite's cysts. Various intestinal disorders can resemble giardiasis, including viral and bacterial gastroenteritis, infections by other parasites, food allergies, and medication side effects. Due to its recurrence and implications for public health worldwide, this study aims to report clinical and therapeutic aspects of canine

giardiasis in three naturally infected dogs in the state of Sergipe, Northeast Brazil. Three adult dogs, presenting a history of acute gastroenteritis, were attended to by the Laboratory of Parasitic Diseases of Animals of the Federal University of Sergipe (UFS), Sertão Campus. Upon physical examination, clinical signs such as anorexia, dehydration, hypochromic mucous membranes, ocular congestion, and the presence of ticks on the fur were observed. Hematological analysis revealed the presence of anemia and leucopenia, while fecal parasitological examination identified the presence of *Giardia* spp. As a therapeutic treatment, a giardicidal protocol was adopted, along with probiotic and vitamin supplementation, in addition to prophylactic guidelines to assist in parasite control and the reduction of environmental contamination.

Keywords: Canine, gastroenteritis, Treatment.

1 INTRODUCTION

Among existing species, dogs (*Canis familiaris*) were the first to be domesticated (FAM, 2018). Although this relationship with humans is not recent, in contemporary times, this closeness has been growing stronger due to the process of "humanization" of pets (CABRAL; SAVALLI, 2020). However, it is essential to consider, in addition to the emotional bond, the issue of public health. This is because the intense proximity between dogs and humans poses risks to human health due to the high number of parasitic infections and other zoonotic diseases that they can cause (CAPUANO; ROCHA, 2006; MA *et al.*, 2020).

There are several groups of parasites that infect the gastrointestinal system of dogs, such as *Ancylostoma* spp., *Toxocara* spp., *Cystoisospora* spp., and *Giardia* spp. (SILVA *et al.*, 2020; GENNARI *et al.*, 1999). *Giardia* spp. is a flagellated protozoan with a direct life cycle and causes giardiasis, a globally significant zoonosis not mandatorily reported in Brazil. This condition affects domestic animals, wildlife, and humans. It is common in companion animals, although there is limited information about its prevalence in dogs and cats in Brazil (BECK *et al.*, 2005). Transmission occurs via the fecal-oral route, primarily through indirect means, such as ingestion of water contaminated with cysts. Infection can also occur through the ingestion of food contaminated by fomites, hands, and contact with contaminated fur (THOMPSON, 2000; NASCIMENTO, 2009).

Infection is caused by the ingestion of the cysts of these protozoa, which subsequently develop into trophozoite forms and lodge in the initial portion of the small intestine, with the duodenum being the main organ affected by the parasites' suckers. They attach themselves to its microvilli, engaging in nutrient absorption through spoliation, leading to an increase in peristalsis and, consequently, triggering an inflammatory response (LUJAN, 2006). The habit of coprophagy, common among young dogs, is an important route for self-infection. It is important to note that humid and unsanitary environments can sustain the survival of cysts for extended periods, as they

are resistant to commonly used disinfectants. This contributes to the agent's dispersion in the environment (ADAM, 2001; FORTES, 2004; FACIULLI *et al.*, 2005).

Clinical manifestations of giardiasis can vary widely, either in association with other conditions or in isolation. This is because, as stated by Lenzi (2013), there are no pathognomonic signs of giardiasis, given that many intestinal diseases resemble this condition. Examples include viral and bacterial gastroenteritis, diseases caused by other parasites, or allergic reactions related to food or induced by drugs. Although animals excrete parasite cysts in their feces, it is pertinent to emphasize that these hosts may or may not exhibit clinical signs of the pathology in question (ROSEZ *et al.*, 2006).

Many of the drugs used in the treatment of giardiasis demonstrate efficacy in combating the parasite; however, they can also cause various side effects in the host. Quinacrine, for example, can destroy the trophozoite and inhibit multiplication but may lead to reactions such as lethargy, vomiting, hyperthermia, anorexia, and intestinal disturbances. A promising alternative in the treatment of giardiasis is the class of nitroimidazoles, with metronidazole being a standout, offering a satisfactory approach in managing giardiasis with a reduction in adverse effects (LALLO; RODRIGUES; BONDAN, 2003).

As giardiasis is considered a recurrent condition with implications for global public health issues, the aim of this study is to report the clinical and therapeutic aspects of canine giardiasis in three naturally infected dogs in the state of Sergipe.

2 CASE REPORT

Three adult dogs with a history of acute gastroenteritis were attended to by the team at the Laboratory of Parasitic Diseases of Animals of the Federal University of Sergipe (UFS), Sertão campus. The first dog (Dog 1) was a male Brazilian Mastiff, adult, eleven months old, weighing approximately 40kg, presenting with symptoms of dysentery and lethargy. During the anamnesis, it was reported that the dog was living in the backyard among with debris, had a female dog as a contact, and was fed with homemade food and commercial dog food. The dog had a history of vaccination and had been dewormed three months ago with VERMEX PLUS® (0.5 - 4 tablets per animal). Upon physical examination, a low body condition score was observed, along with bilaterally enlarged popliteal lymph nodes and a slightly enlarged left submandibular lymph node, as well as the presence of *Rhipicephalus sanguineus* ticks in the fur. However, no abnormalities were found in the physiological parameters.

The second dog (Dog 2) was a male, of the Spitz breed, adult, two years old, weighing 3.6kg, with the main complaint of diarrhea. During the anamnesis, it was reported that the dog, kept

indoors, had no access to the streets or contact with other dogs. The dog was fed dry dog food and had up-to-date vaccination and deworming history. Additionally, it had been previously diagnosed with giardiasis. Upon physical and specific examination, no abnormalities were observed.

The third dog (Dog 3) was a female of mixed breed (SRD), adult, two years old, weighing 16kg, and presented with bloody diarrhea. During the anamnesis, it was reported that the female dog had been rescued from the streets approximately six months ago. Ticks (*Rhipicephalus sanguineus*) were found on her fur, and she was treated with NEXGARD® (1 tablet of 68 mg of afoxolaner per animal). She had no history of deworming, only receiving rabies vaccination, and was fed with homemade food and commercial dog food. Upon physical examination, lymph node enlargement, corneal opacity, pale mucous membranes, dehydration, eye congestion, onychogryphosis, and reduced hair density on the hind limbs were observed.

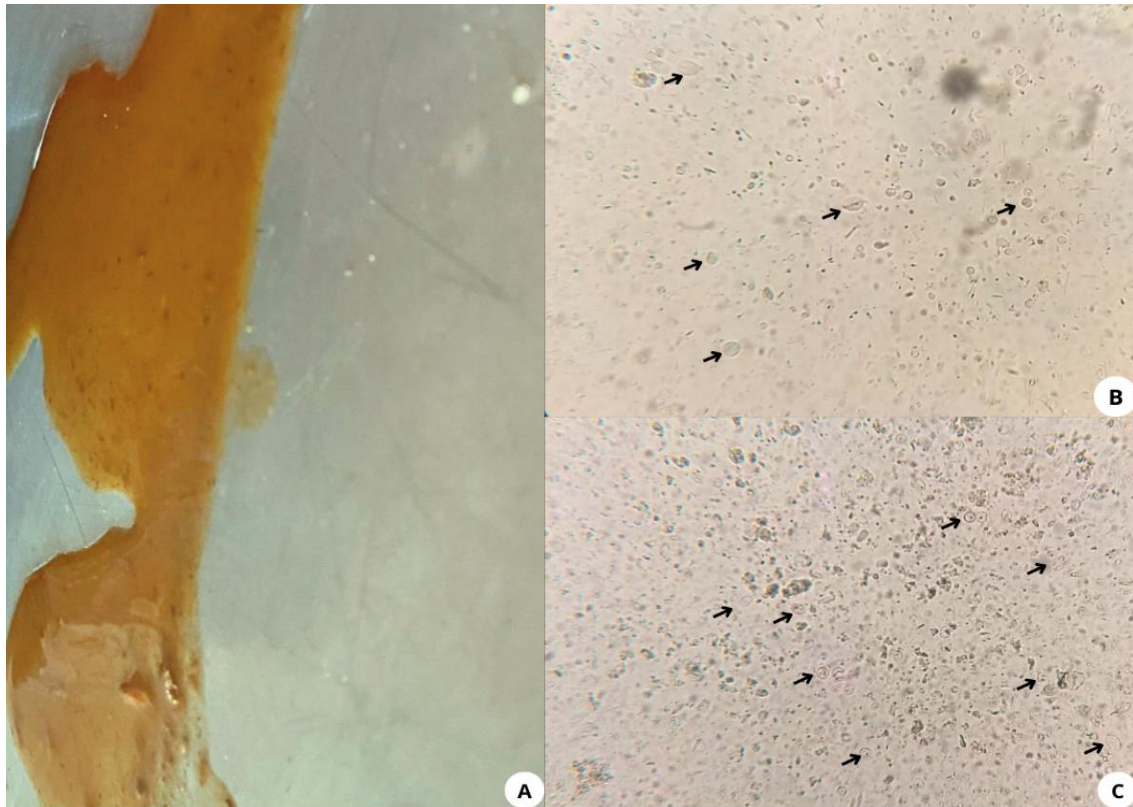
For all animals involved in the study, fecal samples were requested and obtained through spontaneous elimination. Subsequently, the samples were properly labeled and sent to the Laboratory of Parasitic Diseases of Animals of the Federal University of Sergipe (UFS), where they were processed using the simple flotation technique (Willis-Mollay method) for parasitological examination of the feces. The analysis of the samples was conducted through optical microscopy, revealing the presence of *Giardia* spp. cysts in all three animals. Additionally, blood samples were collected and analyzed through blood smears, which showed a clinical picture of anemia and leukopenia in the studied animals.

As a treatment regimen, a set of therapeutic measures was prescribed. Initially, the administration of the Vetnil probiotic supplement (1-4g/day) orally every 24 hours for a period of 30 days was recommended. Additionally, the medication Benzoilmtronidazol (15-25mg/kg) was prescribed orally every 12 hours for 5 days. Vitagold (0.5-2mL/animal) was administered orally for 7 days, and HEMOLITAN®GOLD Liquid (0.1mL/kg) was given orally every 12 hours for 30 days. The medication DRONTAL PLUS® (0.25-1 tablet/animal) was prescribed as a single oral dose exclusively for Dog 1. To prevent reinfection, disinfection of the utensils and environments that the dogs used and inhabited was suggested.

For this purpose, the use of boiling water and quaternary ammonia-based solutions was recommended to reduce the environmental cyst burden. Baths with the application of quaternary ammonia on the animals' fur, especially in the perianal region, were also indicated to remove cysts adhered to the fur, aiding in parasite control and reducing environmental contamination.

On the fifteenth and twentieth days of treatment, all three dogs underwent clinical evaluations, which revealed significant improvement and regression of clinical signs. Based on these promising results, the animals were discharged.

Figure 1. (A) Diarrheal feces in a canine with giardiasis; (B), (C) *Giardia* spp. cysts identified in fecal samples.



Source: Authors (2023).

3 RESULTS AND DISCUSSION

In this study, clinical and therapeutic aspects of canine giardiasis were reported in three animals. Giardiasis, despite having a high incidence in veterinary clinical practice, does not manifest symptoms in all animals (LENZI, 2013). However, the clinical presentation is highly variable and can include both acute and chronic diarrhea, as well as loose to watery foul-smelling stools, with the presence of mucus and blood in the feces, as manifested in dogs 1, 2, and 3 in this study, consistent with the findings of Thompson *et al.* (2008) and Scorza and Lappin (2010).

Other less frequent clinical manifestations include malabsorption syndrome, characterized by anorexia, abdominal distension, flatulence, malnutrition, rickets, and anemia, and dyspeptic syndrome, characterized by epigastric discomfort, eructations, and nausea (SANTANA *et al.*, 2014; JERICÓ *et al.*, 2019). However, the influence of variables such as parasite strain, the duration of the infectious state, dietary composition, or the immune response may play a significant role in understanding the diversity of clinical signs observed in association with the infection (CIMERMAN, 2001). In this case report, clinical signs such as malnutrition, anemia, and bloody diarrhea caused by a combination of malabsorption and electrolyte hypersecretion, along with the diagnosis of the parasite and the recovery of the diseased animals after specific treatment, confirm the diagnosis of giardiasis.

It is also worth noting that factors such as poor socioeconomic conditions, lack of basic sanitation, and overcrowding of dogs and cats in breeding facilities and confined animal shelters contribute to the dissemination of these parasitic agents in the environment. This is exacerbated by the fact that these protozoa have environmental resistance forms, and domestic dogs are important reservoirs of this zoonosis (ROBERTSON, THOMPSON, 2002; ALMEIDA *et al.*, 2007; PAYNE, ARTZER, 2009).

As Meireles (2007) pointed out, the survival of *Giardia* spp. cysts in water is influenced by temperature, with viability lasting for a period of two months in water at 8°C, while at 37°C, this viability is reduced to only four hours. Additionally, they are resistant to conventional water treatment methods. According to the owners of dogs 1, 2, and 3, the animals consumed tap water from a public water supply source. This factor plays a significant role in the diagnosis since the ingestion of water contaminated with cysts is recognized as the primary transmission route for giardiasis in both animals and humans, classifying it as a waterborne disease.

For the diagnosis of *Giardia* spp. cysts, the parasitological examination of feces remains the gold standard, in which direct fecal smear examination or fecal concentration using acetate-formalin and zinc sulfate, followed by microscopic examination, are more traditional techniques (BICA *et al.*, 2011; TAYLOR *et al.*, 2016). Furthermore, as emphasized by Souza *et al.* (2007), it's important to conduct the examination on three different fecal samples for each animal, as cyst shedding is intermittent.

Paulino (2005) further emphasizes that this intermittent cyst shedding characteristic can result in false negatives in all techniques, making them less reliable and not suitable for use as a conclusive diagnosis. However, in this case report, only one fecal sample was collected for each animal, and the presence of *Giardia* spp. cysts was successfully detected using the simple flotation technique (Willis-Mollay), thus achieving a conclusive diagnosis.

Regarding the therapeutic protocol, some of the most recommended medications for treatment include metronidazole at a dose of 25 to 50 mg/kg, orally, every 12 hours for 5 days, and fenbendazole at a dose of 50 mg/kg, orally, for three consecutive days (JERICÓ; ANDRADE NETO; KOGIKA, 2015). The combination of praziquantel, pyrantel pamoate, and febantel has a giardicidal effect in dogs. Febantel, after metabolism, produces a range of metabolites, including fenbendazole, which has an effect against the flagellated parasite (ANDERSON, 2004). According to Reis (2011), metronidazole is a highly effective antimicrobial widely used in clinical situations where the cause of diarrhea is uncertain, encompassing cases of possible bacterial infection, giardiasis, or chronic inflammatory bowel disease.

The specific treatment was carried out based on the causative agent of enteritis, and Benzoilmtronidazole, a derivative of metronidazole, was administered, along with DRONTAL PLUS® and Vetnil Probiotic Supplement. In some cases, the addition of probiotics may be capable of reducing the infection rate and improving signs of lethargy and weight loss in the animal, which is the same protocol established for the animals in this report (KAHN; LENZI, 2013). Due to the nonspecificity of clinical signs, it is worth noting that the control and prevention of this zoonosis, combined with pet owner awareness through the use of protozoacides and proper sanitation, are of paramount importance.

4 CONCLUSION

In light of this situation, it is evident that the clinical manifestation of giardiasis is characterized by a variety of clinical signs, therefore requiring further complementary studies to explore different therapeutic approaches and prevention and management strategies for canine giardiasis. This, in turn, ensures the well-being and health of both humans and animals.

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