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Giardia in symptomatic dogs and cats in Europe—Results of a European study

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ABSTRACT

The percentage of Giardia infection in dogs and cats with gastrointestinal signs presenting to clinics was examined across Europe using the IDEXX SNAP Giardia Test (IDEXX Laboratories). Veterinary practices were asked to identify diarrheic and/or vomiting dogs and cats and to use the test on fecal samples from these animals. A selection for "asymptomatic" testing was also available on the data collection sheet for testing that occurred outside the target "symptomatic" population. Results from 8685 dogs and 4214 cats were submitted during the sampling period from 2005 to 2006. Analysis of the data showed 24.78% of the samples positive for Giardia among tested dogs and 20.3% among tested cats. The younger the dog or the cat, the higher the risk of being positive, peaking in the category below 6 months. The main clinical symptom, diarrhoea, also showed a higher risk of being positive, OR's of acute diarrhoea were almost double of those of the category "asymptomatic" for dogs or cats, the same range was calculated for chronic diarrhoea. Differences in participating countries were also seen. The risk of being positive was half or less in UK, Spain, Netherlands, Italy compared to Germany, and only in Belgium it showed to be higher. The results of this study show that Giardia is a common enteric agent among dogs and cats with gastrointestinal signs in Europe.

1. Introduction

Diagnosing giardiosis is still not easy for many veterinary practices, because even with clinical symptoms such as diarrhoea, the direct diagnosis or aetiological diagnosis of this diarrhoea is challenging. The protozoan cysts of *Giardia* are small and shed intermittently, and veterinarians and staff members are frequently not trained nor have the experience to identify these elusive bodies. In addition, the motile trophozoite stage is typically found only in fresh unformed or liquid faeces. Flotation solutions such as sugar often preclude accurate diagnosis of *Giardia* because the high specific density of these solutions distorts the *Giardia* cysts (Dryden et al., 2006), but even when non-sugar based flotation media (Dryden et al., 2006) is utilized, identification by the untrained eye is can be a challenge. Various studies (Blagburn et al., 1996; De Santis-Kerr et al., 2006; Papini et al., 2005) have evaluated *Giardia* prevalence based on flotation techniques and microscopic analysis of recovered cysts, but because of the different methods utilized, the variability in organism shedding and subjectivity due to lab and operator variability, the true prevalence of giardiosis may be underreported. A proper diagnosis of giardiosis is quite often a challenge. Even among those who routinely perform faecal analyses, recognition of the cysts is difficult if they have not been trained appropriately (cysts are much smaller than helminth eggs and are rather transparent).

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Although trophozoites are motile and therefore relatively easy to observe under a microscope, they are fragile and decompose rapidly, ceasing their movement.

In a study comparing the diagnostic efficacy of sugar flotation, zinc sulfate flotation, and the SNAP *Giardia* Test in the hands of practicing veterinarians (Dryden et al., 2006) only 6 of 27 participants could identify *Giardia* cysts using flotation techniques on a known positive sample. On the other hand, all 27 participants were able to diagnose the samples correctly using the SNAP *Giardia* Test (Dryden et al., 2006). According to earlier study data from the U.S. (Carlin et al., 2006), the SNAP *Giardia* Test (IDEXX Laboratories, Westbrook, ME) offers the advantages of being accurate and easy to use while providing a consistent methodology that removes technical bias (Dryden et al., 2006). Given this reported accuracy, in this study the SNAP Test was used as the diagnostic method for an investigation of the occurrence of *Giardia* spp. among a sample of a large subset of dogs and cats in various European countries. The objective of this study was to determine the prevalence of *Giardia* spp. in dogs and cats presenting to European clinics with clinical signs of gastrointestinal (GI) disease; as study parameters defined as vomiting and/or diarrhoea. With this parameter, the study sought to determine the number of positives of *Giardia* among clinically symptomatic animals using a type of diagnostic test that has demonstrated substantial utility for the identification of other organisms (Carlin et al., 2006).

2. Materials and methods

2.1. Study design

An invitation letter was mailed to 377 veterinary clinics that are part of the IDEXX mailing list in seven European countries (two mailings: one in 2005 and one in 2006) requesting that veterinarians evaluate all canine and feline patients presenting with clinical signs of GI disease (vomiting and/or diarrhoea) for *Giardia* infection using the SNAP *Giardia* Test. The category "asymptomatic" derived from samples were practioners tested animals outside the targeted study population of animals with GI related disease. Providing this option avoided practioners from logging asymptomatic animals inappropriately with the study population. In return for data submission, the clinics received a rebate on the cost of the test.

2.2. Diagnostic method

The SNAP *Giardia* Test (Idexx Laboratories, Westbrook, ME) uses antibody reagents specific for the detection of soluble *Giardia* cyst wall antigens. A fresh faecal sample is collected on a reagent swab which also houses a conjugate-bound antibody solution. Faeces and conjugate are mixed within the reagent swab. If *Giardia* antigen is present, the conjugate-bound antibody binds to it. The faecal-reagent solution is then pipetted on the test device, which contains a membrane coated with secondary antibody; as the solution flows over the membrane, the conjugated antigen is bound by the secondary antibody. After depression of one end of the device and an audible "snap," two waves of suspensions flow: a wash that removes unbound material, followed by a substrate solution. If the substrate solution encounters the conjugated antibody, a blue color is generated that denotes a positive sample. The cyst wall of *Giardia* spp. is formed by the exocytosis of cyst wall antigens in the form of filamentous proteins over the surface of the trophozoite, including the sucking disc (Erlandsen et al., 1996).

2.3. Data management and statistical analysis

Data were submitted on standard forms to IDEXX, indicating the species, clinical signs, test date, and test results for each animal. The data were entered into an standardized Excel spreadsheet (Microsoft, Redmond, WA) and analyzed statistically using SAS®, version 9.1 TS level 1M3 (SAS Institute Inc., 2002–2003). Number of positive and negative *Giardia* spp. outcome were tabeled by different factors under study like species, clinic and countries participating at this exercise. Statistical comparisons were made between species and among countries using multiple logistic regression models. To describe differences between categories adjusted Odds Ratios were used taken all other risk factors under study into account. 95%-confidence intervals were calculated by means of the method of Wald (Hosmer and Lemeshow, 1989). Geographic estimates were plotted and displayed using the software package MapViewer (Golden Software, Golden, CO).

3. Results

A total of 12,899 test results were reported: 203 clinics (response rate 54%) submitted results for 8685 dogs, and for 4214 cats. Most of the canine samples tested came from Germany, Spain and Italy (Table 1). Supplied cat data predominantly came from the same states, with Germany again being the top contributor of samples (Table 2).

Overall percentage of positive samples for dogs was 24.8%. Individual country sample numbers and positive values for dogs showed highest percentage in Belgium (28.47%) and France (27.53%; Table 1). Results for dogs were separated according to age, gender, symptoms and participating countries. Female dogs showed a lower frequency of being *Giardia* positive than male dogs. Taken an age category of 2–5 years as reference, dogs older than 5 years had less risk of being positive for *Giardia*. However, the younger the dog, the higher the Odds Ratio, i.e. the higher the risk of being positive, peaking in the category below 6 months with 42.86% of the samples tested positive and an almost 4 times higher OR (Table 1). The main clinical symptom diarrhoea shows also higher risk of being positive, OR's of acute diarrhoea (26.99% positive), and same range was calculated for chronic diarrhoea (28.04% positive). Differences in participating countries were also seen with the risk of being positive in UK half of that in Germany (taken as baseline here randomly), and in Belgium (OR 1.166% and 28.47% positives) or France (OR 1.396% and 27.53% positives) it showed to be higher (Table 1).

For dogs included in this study, their origin was not consistently documented. For those defined as having an origin with breeder or shelter, however, a similar percent-