Prevalence of gastroenteritis in dogs

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Abstract.
Currently, gastrointestinal pathology in small animals reaches up to 50% of the total number of non-communicable diseases and ranks first among them. This article provides a comprehensive examination of the prevalence of gastroenteritis in dogs, offering valuable insights into the frequency and impact of this gastrointestinal ailment in the canine population.

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Gastroenteritis is an inflammation of the mucous membrane and other tissues of the stomach and small intestine, which is accompanied by a violation of their secretory, motor, excretory, absorptive and protective functions. The pathological process can also involve the large intestine, in which case the disease is called gastroenterocolitis. Less commonly, the disease occurs with only the small intestine (enteritis) or the large intestine (colitis) without stomach damage. Gastroenteritis (enteritis, colitis or gastroenteritis) can be acute and chronic; by the nature of inflammation - serous, catarrhal, hemorrhagic, fibrinous; by distribution - focal and diffuse; localization - superficial, when the mucous membrane is mainly affected, and deep, when other by the etiology - primary and secondary.

The main causes of acute gastritis are food intolerance, nutritional stress, mechanical and chemical damage, foreign bodies, invasions, and infections (helicobacter, enterovirus, and coronavirus enteritis). Chronic gastroenteritis can have an infectious etiology, as well as develop in long-term inflammatory processes, mechanical damage, and neoplasia. A complete diet is the main factor in maintaining proper animal health and quality treatment of many diseases, including those of the gastrointestinal tract.

The research published in The Pharma Innovation Journal (2020) spanned from March 2018 to February 2019 and involved 4,747 dogs afflicted with gastroenteritis. During this one-year timeframe, the prevalence of gastroenteritis in dogs was found to be 12.24%, with a total of 593 dogs diagnosed with this condition out of 4,847 dogs included in the study. It's worth noting that a prior epidemiological investigation by Jani (2004) reported a higher prevalence of enteritis in dogs at 19.3%. Additionally, Rakha et al. (2015) conducted a prevalence study revealing that digestive issues accounted for the most common clinical diseases in dogs, comprising 56.50% of cases. Likewise, in a retrospective study among puppies conducted by Tagorti (2019), a similar prevalence rate of gastroenteritis (13.40%) was documented.

Canine parvovirus-2 (CPV-2) is one of the most widespread infectious illnesses seen in dogs and is characterized by severe enteritis, vomiting, bloody diarrhea, and shock. There are other viral diseases, such as coronavirus and rotavirus...
infections, that can also result in significant gastrointestinal inflammation, although the clinical symptoms of these viral illnesses are generally less severe compared to CPV-2. This could be because they primarily affect the villi's tips, whereas CPV-2 impacts the crypts.

Bacterial enteritis. The most commonly implicated bacterial agents in acute gastroenteritis among dogs and cats include Clostridium perfringens, Clostridium difficile, Campylobacter jejuni, Campylobacter upsaliensis, Salmonella spp., Helicobacter spp., and enterotoxigenic E. coli. There is an ongoing debate about whether some of these organisms genuinely lead to clinical disease since they can also be found in individuals without diarrhea and in animals with diarrhea. The advent of advanced diagnostic techniques like ELISA and PCR testing has prompted newer recommendations for a comprehensive assessment to definitively diagnose certain bacterial pathogens. There is substantial evidence supporting the involvement of Clostridium spp. in gastroenteritis; however, as many dogs carry C. perfringens and its CPE toxin in their gastrointestinal tracts without displaying clinical symptoms, ongoing research is necessary to evaluate the roles of these organisms, as well as those of Campylobacter and Helicobacter spp., in companion animal gastrointestinal diseases.

Parasitic gastroenteritis. While most dogs and cats infected with gastrointestinal parasites exhibit mild clinical symptoms, ascarids (such as Toxocara spp., Toxascaris leonina, Ollulanus tricuspis, and Physaloptera spp.), hookworms (including Ancylostoma spp. and Uncinaria stenocephala), and whipworms (Trichuris spp.) have the potential to induce substantial inflammation in the gastrointestinal tract, leading to vomiting and diarrhea. Severe hookworm infestations often result in gastrointestinal bleeding. Protozoans responsible for gastroenteritis in dogs and cats encompass Giardia spp., Coccidia, and Cryptosporidia spp. Tritrichomonas foetus infection is another protozoal cause of diarrhea in cats, primarily affecting the large bowel, with symptoms that may fluctuate. Although affected patients may appear in poor condition, this infection rarely leads to critical illness.
Gastrointestinal fungal infections. Fungal infections can impact the gastrointestinal system of dogs and cats, although the risk varies depending on the geographic location of the animal or recent travel history. Histoplasmosis is the most frequent fungal pathogen affecting the gastrointestinal tract, resulting in a severe condition known as protein-losing enteropathy (PLE). Additionally, Pythium spp., an oomycete, can induce similar gastrointestinal diseases.

The extent of diagnostic evaluation for a dog showing signs of acute gastroenteritis depends on various factors, including the patient's medical history, prior occurrences of similar symptoms, and the stability of the dog's condition. In most cases of acute gastroenteritis, it is advisable to assess fecal samples for parasitic infections and bacterial pathogens. This assessment should include a culture and Gram stain analysis, with fecal samples being tested at least three times to confirm negative results. The testing for clostridial enterotoxins may involve the use of enzyme-linked immunosorbent assays (ELISA) to detect C. perfringens enterotoxin or C. difficile toxins A and B. Recent advances in real-time PCR testing have provided an additional diagnostic approach for detecting common organisms in small animals. Additionally, a Giardia antigen test is available, and if parvovirus is suspected, a fecal antigen test (ELISA) should be conducted.

A systemic evaluation should encompass a complete blood count, chemistry screen, and urinalysis. Typically, these tests yield normal results and do not contribute significantly to identifying the underlying cause of gastroenteritis. However, in specific situations like Hemorrhagic Gastroenteritis (HGE), where the packed cell volume (PCV) is elevated with a normal to decreased total protein concentration, or Protein-Losing Enteropathy (PLE), which may lead to a decrease in total protein, globulin, albumin, and cholesterol levels, these tests can aid in diagnosis. Electrolyte levels should be monitored regularly to ensure proper fluid management.

Abdominal radiographs may not yield definitive results but can show signs of fluid-filled bowel loops. Radiographs are warranted if there is suspicion of a gastrointestinal
obstruction, such as a foreign body or neoplasia. Abdominal ultrasonography is a valuable tool for evaluating all abdominal organs, including assessing the thickness and layering of the stomach and small intestine. However, these findings may lack sensitivity and specificity, so they should always be interpreted alongside other diagnostic tests.

If PLE is suspected and stomach and intestine biopsies are required, there are two primary methods for obtaining them. Endoscopy offers a noninvasive means of visualizing and obtaining small biopsy samples (1.8- to 2.4-mm) from the esophagus, stomach, and duodenum. However, its limitations include small sample sizes and the inability to obtain biopsies distal to the duodenum. Ileal samples can be acquired through colonoscopy, but this requires patient preparation, including cleansing enemas, which may pose risks to unstable animals due to fluid and electrolyte shifts. An alternative method for obtaining samples is through exploratory laparotomy, which allows for full-thickness biopsy samples from multiple areas of the GI tract (and other organs if abnormalities are found). Disadvantages of this approach include invasiveness and concerns about wound healing, particularly in patients with reduced albumin levels. Laparoscopy offers an alternative, less invasive approach to achieve excellent abdominal cavity visualization and obtain full-thickness biopsies of the GI tract (and other organs as needed). Laparoscopy may have less morbidity due to smaller incisions but still raises concerns about gastric and intestinal biopsy site healing in patients with low albumin levels or diseased tissue.

The most common clinical signs of gastroenteritis include vomiting, diarrhea, and loss of appetite. However, these symptoms are not exclusive to gastroenteritis and can occur in various other diseases. Therefore, diagnosing gastroenteritis often involves ruling out other potential causes. Differential diagnoses may encompass systemic conditions like kidney disease, liver disease, hypoadrenocorticism, complex diabetes mellitus (diabetic ketoacidosis), vestibular disease, or other neurological abnormalities, pancreatitis, pyometra, prostatitis, and peritonitis. Additionally, primary gastrointestinal diseases
such as intussusception, foreign body or mass obstructions, infiltrative diseases (neoplasia, infectious), or ischemia should be considered and ruled out before definitively diagnosing gastroenteritis.

The authors of the article "A prevalence study on dogs suffering from gastroenteritis" conducted a study, according to which gastroenteritis was more prevalent in male dogs, accounting for 60.88% of cases, whereas female dogs exhibited a lower incidence at 39.12%. This study revealed a lower susceptibility of female dogs (39.12%) in comparison to their male counterparts (60.88%). These findings align with those of Jani (2004) [6], who also reported a higher prevalence of gastroenteritis in male dogs (59.26%) compared to female dogs (40.74%). Similar results, indicating a higher incidence of gastroenteritis in male dogs (68.88%) than in female dogs (31.12%), were observed by Bhat et al. (2015) [1]. Tagorti (2019) [5] likewise noted a higher prevalence of gastroenteritis in male dogs (57.86%) in contrast to female dogs (42.14%).

The occurrence of gastroenteritis in dogs was observed consistently throughout the year. The highest number of dogs afflicted with gastroenteritis was noted during the winter months, accounting for 30.19% of cases. During the summer, spring, and autumn months, the prevalence of gastroenteritis in dogs was 25.46%, 24.28%, and 20.07%, respectively. The increased prevalence during winter months may be attributed to the stress induced by adverse weather conditions, which can lead to immune suppression in dogs. These findings are consistent with a previous study (Shinde et al., 2000) [6], which reported the highest gastroenteritis prevalence in the winter season (39.75%), followed by the monsoon (35.90%) and summer (24.35%). Another study on hemorrhagic diarrhea syndrome in dogs by Mortier et al. (2015) [7] also indicated a higher incidence of gastroenteritis during the winter season compared to other seasons. Additionally, Tagorti (2019) [5] found an increased occurrence of gastrointestinal diseases, with 60.19% during the wet season (September-February) and 39.81% during the dry season (March-July).

The highest incidence of gastroenteritis was observed among dogs under one year of age, accounting for 72.18% of
cases. Among dogs aged three months or less, the prevalence was 29.34%, while those between three months and six months had a prevalence of 26.31%. Dogs aged more than six months but less than one year had the lowest prevalence at 16.53%. Adult dogs in the one to five-year age group exhibited a gastroenteritis prevalence of 27.82%. These findings are consistent with the results of Bhat et al. (2015) [1], who also reported a higher prevalence of gastroenteritis in dogs under one year of age (86.66%) in their study on canine gastroenteritis [8].

According to the processed information on the breed structure of dogs with diarrhea, it was found that the emphasis shifted towards small breeds: Spitzes - 18.3%, Cocker Spaniels - 13%, Yorkies - 28.4%, Chihuahuas - 12.6%, Terriers - 16.4%, Jack Russell - 12.8%. Among the large breeds, Labradors were more likely to be ill - 5.2%, German Shepherds, Rottweilers, Dobermans, Bull Terriers, Collie, Bulldogs, Irish Setters, Great Danes, and Dalmatians were less likely to need help - they accounted for 3.7% of the total [2]. This can be explained by the decline in the population of such breeds in urban areas [4].

Vaccination and deworming. Dogs that had not received vaccinations had a gastroenteritis prevalence rate of 52.95%, while those that were either fully or partially vaccinated had a prevalence rate of 47.04%. Additionally, dogs that had not undergone deworming had a higher prevalence of gastroenteritis (57.50%) compared to dogs that had been completely dewormed (42.49%). The suboptimal status of deworming and vaccination may have played a role in the development of the disease in these afflicted dogs, in line with the findings of Saxena et al. (2006) [9]. The elevated prevalence of gastroenteritis in vaccinated dogs could potentially be attributed to improper vaccination schedules or the use of vaccines that were not properly maintained. Vaccination is essential for safeguarding dogs against major viral diseases, particularly those that commonly affect all age groups, particularly puppies under six months of age. According to Cavalli et al. (2008) [10], susceptibility to viral infections causing gastroenteritis often coincides with the period when puppies are separated from their mothers, as
the level of protective or maternal immunity declines. A subpar antibody response to vaccination might result from improper timing, failure to administer booster shots, interference from maternal antibodies, or inadequate cold chain maintenance, as noted by Deka et al. (2013) [11].

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