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EPIZOOTOLOGICAL MONITORING OF THE INCIDENCE OF PARVOVIRUS ENTERITIS IN DOGS IN KOSTANAY, REPUBLIC OF KAZAKHSTAN

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Abstract

Parvovirus enteritis of dogs is the cause of a highly contagious acute disease of many carnivorous animals, which leads to severe gastroenteritis and myocarditis. Parvovirus infection is characterized by severe enteritis and vomiting, as well as dehydration, fever, leukopenia and diarrhea. The article presents data on the frequency of occurrence of the disease in dogs with parvovirus enteritis in Kostanay, the Republic of Kazakhstan. In order to assess the epizootological situation of parvovirus enteritis, the logs of registration of sick animals, the results of rapid tests for infectious diseases of dogs of private veterinary clinics of the city for the period from 2020 to 2023 were analyzed. The object of the study was dogs of different breeds and age groups. Data analysis has shown that parvovirus enteritis is the most common infectious diseases of dogs. It was diagnosed in 20.3% of veterinary clinic patients, in two forms of intestinal and myocarditis. The disease is seasonal. Infection of dogs with parvovirus occurs mainly in spring (35,6%) and autumn (37,8%). The analysis of the sex and age structure of patients with parvovirus enteritis indicates a greater susceptibility to the disease of puppies under the age of one year. 86% of patients belonged to this age group. Dogs get sick regardless of gender.

Key words: CPV; dog; epizootological monitoring; infectious diseases; intestinal form; myocarditis form; parvovirus enteritis.

Introduction

In addition to the main pathology of animals, which is mainly determined by diseases of a diverse nature, epizootic infections remain relevant [1]. In modern veterinary medicine, from the scientific and practical side, little attention is paid to the problem of infectious diseases of domestic animals (dogs, cats, etc.) of viral etiology, which do not belong to particularly dangerous diseases for humans and animals [2]. The improvement of the epizootic state for a number of infectious diseases is largely the key to the epidemic well-being of the population in the regions and the country as a whole. Viral infections represent one of the numerous groups of infectious diseases among dogs, as a rule, have a different form

of clinical course, including the development of complications [3]. Taking into account the position of dogs in society, these animals, especially high-bred ones, are susceptible to many types of infectious diseases. When studying infectious diseases, special attention should be paid to viral infections, among which the most contagious are distinguished, one of such common diseases is parvovirus enteritis.

Parvavirus enteritis of dogs is the cause of a highly contagious acute disease of many carnivorous animals, which leads to severe gastroenteritis and myocarditis [4]. Parvovirus infection is characterized by severe enteritis and vomiting, as well as dehydration, fever, leukopenia and diarrhea. Treatment of this infection is mainly symptomatic, antimicrobial and antiemetic drugs are also used. The disease has very low survival rates in dogs that have not been treated [5]. The pathogen causes severe clinical disease in puppies under the age of 5 months and adult dogs with insufficient immunity [6]. The susceptibility and mortality rate of this disease in various animal species varies widely. In populations of non–immune dogs and fur-bearing animals, mortality from parvovirus enteritis among adult animals can reach 10-15%, among young animals it is significantly higher - 30-50%, in acute cases it reaches 100% [7].

Enteritis is caused by canine parvovirus (CPV), which has maintained pandemic circulation among dogs for more than 40 years [8]. The pathogen is currently enzootically circulating in the dog population around the world. This virus has a huge ability to mutate. Over 40 years of existence, the original strain has undergone several mutations that gave rise to 3 subtypes: CPV-2a, b, c. The latter are characterized by increased virulence and the ability to recover quickly [9, 10]. In addition to resistance in the external environment, canine parvovirus is characterized by the speed and ease of spread, which is the reason for its spread around the world [11].

Undoubtedly, parvovirus enteritis is one of the most common infectious diseases of dogs, which is registered all over the world and has a different form of clinical course. Currently, domestic dog breeding is developed and at the same time pedigreed animals are most susceptible to viral infections with a complicated form of the course [12].

In this regard, special attention should be paid to the study of the prevalence and frequency of parvavirus enteritis. This will undoubtedly make it possible to periodically monitor frequently reported infectious diseases in dogs, which is of particular relevance for timely prevention and correct diagnostic algorithms using effective therapies [13, 14].

The aim of the study was to conduct epizootological monitoring of parvovirus enteritis of dogs in Kostanay.

Materials and methods

The research was carried out on the basis of five private veterinary clinics in Kostanay, the Department of Veterinary Medicine and the Research Institute of Applied Biotechnology of the Akhmet Baitursynuly Kostanay Regional University.

The object of research was dogs of different breeds and age groups. When assessing the epizootological situation, were used the materials of the logs of registration of sick animals, the results of rapid tests for infectious diseases of dogs of private veterinary clinics of the city for the period from January 2020 to December 2023.

The diagnosis of parvovirus enteritis in dogs was made comprehensively, taking into account epizootological data, anamnestic survey of the owners, clinical examination according to generally accepted methods, studies of general and biochemical blood analysis, if necessary, ultrasound of the abdominal cavity and X-ray.

The final diagnosis was made based on the results of immunochromatographic analysis for the detection of specific antigens of canine parvovirus strains CPV2, CPV2a, CPV2b and CPV2c in dog faeces (QBQVET, Moscow, Russia).

At diagnosis, gastroenteritis of alimentary origin, gastroenteritis of parasitic origin, colibacteriosis, coronavirus enteritis, infectious hepatitis, rotavirus infection were differentiated.

Results

During the period from January 2020 to December 2023, in five private veterinary clinics of the city of Kostanay, 2234 dogs with various infectious and non-infectious pathologies were accepted and clinically examined, of which 24.7% were animals with infectious diseases. Analyzing the data from the

logs of registration of sick animals of veterinary clinics, as well as the results of immunochromatographic analysis for infectious diseases of dogs, it was found that a significant percentage (20.3) accounted for parvovirus enteritis of dogs, was registered in 455 animals. Of these, 103 cases of the disease were observed in 2020, 128 cases in 2021, 115 cases in 2022, and 109 cases of canine parvovirus enteritis in 2023 (Figure 3).

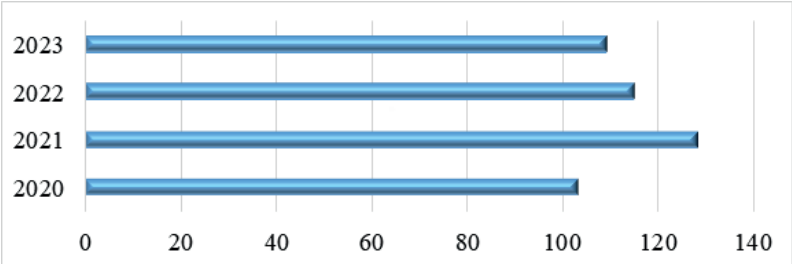

Figure 3 – The number of dogs with parvovirus enteritis in Kostanay, in the period 2020-2023.

An analysis of dog cases of parvovirus enteritis by year showed that in 2021, compared with 2020, the incidence of dogs increased by 24.3% (an absolute increase of 25), and in 2022 and 2023 there was a noticeable decrease in incidence by 10.2% (abs.13) and 5.2% (abs. 6), respectively. On average, 113.75±6.17 cases of canine parvovirus enteritis are detected annually (Table 1).

Table 1 – Dynamics of the increase in the incidence of parvovirus enteritis in dogs in Kostanay, in the period 2020-2023

Year	Number of patients	Absolute		The indicator of visibility, %	Growth rate, %	Pace, %	
		increase	decrease			growth	decrease
2020	103	no		100.0	no	no	
2021	128	25.0		124.3	124.3	24.3	
2022	115		13.0	111.7	89.8		10.2
2023	109		6.0	105.8	94.8		5.2

An analysis of the seasonal dynamics of the incidence of parvovirus in dogs showed that the disease is registered year-round in the form of local enzooties with spring and autumn rises. Most often, parvovirus diseases in dogs were observed in October (19.8%) and April (16.7%). A slightly smaller number of dogs with parvovirus were registered in March, May, July, August, September, December. The frequency of disease detection in these months of the year ranged from 5.5% to 12.5%. January, February, and June can be considered relatively prosperous months of the year for parvovirus enteritis. The frequency of diagnosis of the disease in these months did not exceed 3.9% (Figure 4).

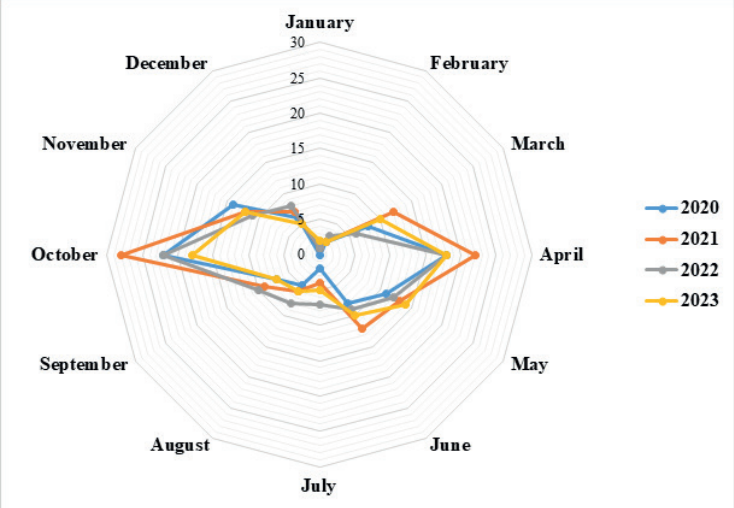

Figure 4 – Seasonal dynamics of the incidence of parvovirus in dogs

Parvovirus enteritis was mainly detected in young, unvaccinated dogs aged two months to a year, the frequency of diagnosis of the disease in dogs at this age was 86% (391 animals), of the total number of cases of the disease, of which 69% were dogs under six months old, and in animals older than 1 year – 14% (64 animals), which turned out to be statistically significant ($\chi 2 = 350.2$; $p < 0.001$) (Figure 5).

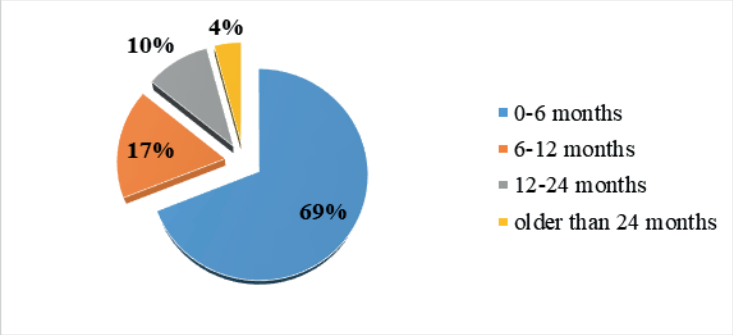

Figure 5 – Distribution of parvovirus cases depending on age

The disease was registered in two forms – intestinal and myocarditis, while the myocarditis form was detected mainly in puppies up to two months of age (Table 2).

Table 2 – Symptoms and forms of parvovirus enteritis

Form	Age	Symptoms
Intestinal	Dogs of all ages	Vomiting, and vomiting movements are repeated at intervals of 30...40 minutes, an increase in body temperature to 41 °C, diarrhea, rapidly increasing dehydration from 8% and above, abdominal pain, pallor of the mucous membranes, tachycardia.
Myocarditis	In 98% of cases, puppies under 2 months old	Signs of heart failure. Cyanosis of the mucous membranes, tachycardia or bradycardia, pulse of weak filling. Shallow and saccaded breathing, collapse

The analysis of the breed susceptibility of dogs to parvovirus enteritis showed that the frequency of diagnosis of the disease in mongrel dogs was 24.8%, and in pedigreed dogs -75.2%, which turned out to be statistically significant ($\chi 2 = 54{,}8$; $p < 0{,}001$). Rottweiler dogs were susceptible to parvovirus enteritis – 32 cases (9.3%), German Shepherd – 42 cases (12.3%), collie – 12 cases (3.5%), pit Bull Terrier - 19 cases (5.5%), Caucasian Shepherd - 34 cases (9.9%), Dachshund- 26 cases (7.6%), spaniel- 23 cases (6.7%), pygmy pinscher- 18 cases (5.2%), Doberman- 16 cases (4.6%), poodle- 12 cases (3.5%), Labrador- 42 cases (12.2%), Toy Terrier- 24 cases (7%), Pomeranian- 28 cases (8.2%), corgi – 14 cases (4%).

The sexual predisposition of dogs to parvovirus has not been established. Thus,
the incidence of females was 49%, and males - 51% ($\chi 2 = 0.55$; $p > 0.5$).

Discussion

Parvovirus enteritis of dogs is widespread all over the world and causes the death of young dogs, despite the availability of effective vaccines [15-17]. The analysis of the epizooological situation in the city of Kostanay, Republic of Kazakhstan for the period from January 2020 to December 2023 also showed that the first place among infectious diseases is occupied by parvavirus enteritis, which is registered in 20.3% (n=455) of cases, in two forms: intestinal and myocarditis. On average, within one year, according to five veterinary clinics, about 108 cases of the disease are registered in the city. On average, during one year, according to five veterinary clinics, about 113.75±6.17 cases of dog disease are registered in the city. In 2021, compared with 2020, there was an increase in the incidence of parvovirus in dogs, which amounted to 24.3%, and in 2022 and 2023, a decrease in the incidence of 10.2% and 5.2%, respectively, was observed.

The disease is fixed year-round, but the frequency of reported cases depends on the season. Infection of dogs with parvovirus occurs more often in autumn (37.8%) and in spring (35.6%). This may be due primarily to the fact that it is during this period that there are sharp temperature fluctuations during the

day, high humidity and, as a result, a decrease in the overall resistance of the body, which increases the risk of the disease.

We found that out of the total number of registered animals with parvovirus, the disease is most often observed in puppies under the age of 1 year, the disease was registered in 86% of cases, these results correlate with studies conducted in other countries where the incidence of parvovirus among animals of the first year of life is more than 80% [18, 19]. In adult dogs older than one year, the incidence was less frequent, mainly in unvaccinated animals or in animals with reduced immunity, i.e. who have been ill with other infectious (colibacteriosis) and invasive (babesiosis) diseases.

The analysis of the breed susceptibility of dogs to parvovirus enteritis showed that the frequency of diagnosis of the disease in mongrel dogs was 24.8%, and in pedigreed dogs -75.2%, which turned out to be statistically significant ($\chi 2 = 54,8$; $p < 0,001$). Dogs of the Rottweiler breed, German Shepherd, collie, Pit Bull terrier, Caucasian Shepherd, Dachshund, spaniel, dwarf pinscher, Doberman, poodle, Labrador, Toy terrier, Pomeranian, Corgi were susceptible to parvovirus enteritis.

The sexual predisposition of dogs to parvovirus has not been established.

Despite extensive vaccination, the main reason for the widespread spread of the virus is still represented either by the intervention of maternal antibodies in vaccinated puppies (the so-called susceptibility window), or by the low effectiveness of immune protection in adult dogs [18, 19].

Conclusion

The analysis of the epizootological situation of parvovirus enteritis of dogs in the city of Kostanay, for 2020-2023, showed that the disease is widespread, occupies 20.3% in infectious pathology in dogs. The disease is registered all year round, but the frequency of reported cases depends on the season. During the year, there are two rises in the disease – spring and autumn, when dogs are infected with parvovirus. Puppies and young dogs are more likely to get sick, especially with a lack of immunization.

Scientific research was carried out within the framework of fulfilling the tasks of dissertation research and will subsequently be submitted for public defense of a doctoral dissertation.

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