

Part 1. Veterinary medicine

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A RETROSPECTIVE STUDY OF CANINE PARVOVIRUS IN PRIVATE VETERINARY CLINIC 'HEALTH', SUMY REGION, UKRAINE (2015–2018)

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Summary. The aim of the research is to conduct retrospective study of canine parvovirus in private veterinary clinic 'Health' in the Sumy region, Ukraine. Because of the widespread nature of the CPV infection and paucity of information on its epidemiology in Ukraine, it is necessary to carry out a retrospective study of the disease in Ukraine. Data on reported and confirmed cases of CPV infection, which was presented to private veterinary clinic 'Health' (Sumy), between 2015 and 2018 was reviewed. The data were sorted according to age, sex, breed, as well as treatment and vaccination status. The overall prevalence rate was 2.1%. Age, sex, breed, vaccination status showed association with the rate of infection. 43 (68.3%) puppies younger than 6 months old had higher incidence rate than those ones older than 6 months. Males (36 individuals, 57.1%) were more affected than females (27, 42.9%), while exotic breeds (43, 68.3%) were more affected than local breeds (20, 31.7%) and the number of recovered dogs (59, 93.7%) was higher than those who died (4, 6.3%). However, the majority of dogs was not vaccinated (46, 73.0%) in comparison to vaccinated dogs (17, 27.0%). The incidence (25, 40.0%) was observed in 2017. In conclusion, there is high prevalence of CPV infection in Ukraine with young, male and exotic breeds being affected much more than old, female and local breeds. Low incidence of death rate among the affected dogs may be attributed to successful immunization against the disease.

Keywords: dogs, canine parvovirus enteritis, epidemiology, prevalence, Ukraine

Introduction. The first mammal domesticated by human was a dog (*Canis familiaris*). They have been living together as companions since that, and they are useful for human as working partners and pets (Birchard and Sherding, 2006). The affection developed by humans towards dogs continues until this time (Daodu, Amosun and Oluwayelu, 2017).

Canine parvovirus (CPV) infection is a highly contagious, fatal disease of dogs, affecting mostly the gastrointestinal tract. The infection has no predilection for age, sex or breed of dogs. However, the Doberman pinscher, the Rottweiler and the German Shepherd Dog are at greater risk of the infection as compared to other breeds (Touihri et al., 2009; Castro et al., 2007; Gombač et al., 2008). It is a major cause of morbidity and mortality in puppies (Goddard and Leisewitz, 2010). It is transmitted from infected to susceptible dogs through the fecal-oral route and exposure to fomites (Decaro et al., 2005; Nivy et al., 2011). CPV infection also transmitted by house flies, flesh flies and blow/bottle flies (Bagshaw et al., 2014). The disease is characterized by anorexia, vomiting, bloody diarrhea, lethargy, myocarditis and leucopenia (Streck et al., 2009; Tabor, 2011).

CPV is a small, non-enveloped, linear, single-strand DNA virus of the family Parvoviridae (Prittie, 2004; McCaw and Hoskins, 2006).

Three antigenic variants of CPV-2 (2a, 2b, and 2c) have been reported to be in global circulation, and their frequency of occurrence varies according to the geographical location (Bingga et al., 2014; Touihri et al., 2009; Wilson et al., 2014).

The diagnosis is based on clinical signs which include fever, nausea, abdominal pain, vomiting and bloody diarrhea (McCaw and Hoskins, 2006). The final diagnosis is based on electron microscopy, virus isolation, fecal hemagglutination, latex agglutination, counter-immunoelectrophoresis, immunochromatography, and PCR (Macintire and Smith-Carr, 1997; Pollock and Carmichael, 1988; Desario et al., 2005; Oh et al., 2006). PCR has been shown as more sensitive and reliable than other diagnostic methods (Desario et al., 2005; Buonavoglia et al., 2001).

CPV infection is primarily treated using supportive care, fluid therapy (crystalloid fluids, synthetic and natural colloids), a combination of antibiotics, antiemetics,

analgesics, nutritional support, and anthelmintics (Prittie, 2004; Brown and Otto, 2008).

Prevention of the disease is carried out by vaccination, 3 doses given at the age of 6, 9, and 12 weeks old using attenuated or modified live vaccines (Bergman et al., 2006).

However, some commercial CPV vaccines are not able enough to stimulate immunity against CPV-2 infection in puppies with high titers of maternally derived antibodies (Larson and Schultz, 1997).

Maternal antibodies cause failure of vaccination, and their presence should be checked before vaccination (Prittie, 2004). Because of the widespread of CPV infection worldwide, there is need to study prevalence of the disease in Ukraine.

The aim of the study was to conduct retrospective study of canine parvovirus in private veterinary clinic 'Health' in the Sumy region, Ukraine.

Materials and methods. The data was collected from private veterinary clinic 'Health' located in Sumy region, Ukraine (50° 55' 17.76" N, 34° 48' 1.04" E).

The records of dogs presented by other diseases and canine parvovirus infection within a period from 2015 to 2018, were collected and sorted according to age, sex, breeds, vaccination status, type of care and treatment.

Table 1 — Distribution of canine parvovirus infection

Groups	Total number of diagnosed cases	
	Frequency, n	Percentage, %
Age (Months)		
< 6	43	68.3
> 6	20	31.7
Sex		
Male	36	57.1
Female	27	42.9
Breed		
Local	20	31.7
Exotic	43	68.3
Vaccination Status		
Vaccinated	17	27.0
Unvaccinated	46	73.0
Movement of dog		
In house	47	74.6
Out house (Stray)	16	25.4
Treatment		
Recovered	59	93.7
Dead	4	6.3

This study shows that CPV infection was endemic in Sumy during the period from 2015 to 2018. The prevalence of 2.1% (63 individuals, 3,010 cases) diverges from higher prevalence rate of 3.4% (84 and 2,486 respectively) reported in Slovenia (Gombac et al., 2008).

The diagnoses were based on history, clinical signs and laboratory findings using X-ray, ultrasound and SensPERT® Canine Parvovirus Antigen Test Kit. The prevalence and associated risk factors of CPV disease were analyzed and presented using chi square and significant differences were detected at 5% level (Petrie and Watson, 1999).

Results and discussion. Out of 3,010 cases presented to private veterinary clinic 'Health' within the study period, 63 (2.1%) cases were diagnosed of canine parvovirus infection.

Dogs younger than 6-month-old were more affected (43 individuals, 68.3%) than those ones who older than 6-month-old (20, 31.7%).

Females, (27, 42.9%) were less susceptible as compared to males (36, 57.1%).

Local breeds of dogs were also less affected (20, 31.7%) in comparison to exotic breeds (43, 68.3%).

However, unvaccinated dogs (46, 73.0%) were more affected than the vaccinated dogs (17, 27.0%).

The incidence rate was higher in household dogs (47, 74.6%) than in outhouse dogs (16, 25.4%) (Table 1).

The highest prevalence rate (25, 40.0%) was observed in 2017 with a monthly distribution in February and November (9, 14%) (Table 2).

Table 2 — Yearly and monthly distribution of canine parvovirus cases at private veterinary clinic 'Health', Sumy between 2015-2018.

Period	Total number of diagnosed cases	
	Frequency, n	Percentage, %
Years		
2015	13	20.6
2016	15	23.8
2017	25	39.7
2018	10	15.9
Months		
January	8	12.7
February	9	14.2
March	2	3.2
April	2	3.2
May	4	6.4
June	2	3.2
July	4	6.4
August	3	4.8
September	6	9.5
October	8	12.7
November	9	14.2
December	6	9.5

This might be caused by the higher awareness of dog vaccination by owners and breeders. The incidence of 43 (68.3%) for < 6-month-old dogs as well as 20 (31.7%) for > 6-month-old dogs agrees with the reports that dogs within the age limits (i. e. puppies between 6 weeks and

6 months old) have a higher risk to be infected (McCaw and Hoskins, 2006; Prittie, 2004).

It might be possible due to a decrease of maternally derived antibodies level from vaccinated or naturally infected female dogs before primary vaccination, leaving puppies without protection and therefore vulnerable to CPV infection (Houston, Ribble, and Head, 1996).

The higher prevalence rate (36, 57.1%) in males as compared to females (27, 42.9%) agrees with the findings that male dogs are more affected than female dogs (Shima, Apaa and Mosugu, 2015; Tion et al., 2018), but diverges with the hypothesis that females are more susceptible than males (Umar et al., 2015). However, Castro et al. (2007) reported that the disease does not have predilection for sex. Therefore, sex predilection can occur due to the preference for male dogs as pets or for security, as compared to female dogs that may be needed much more by breeders.

The higher incidence rate (43, 68.3%) of exotic breed compared to local breed (20, 31.7%) as well as highest incidence rate of mongrels (20, 31.7%); the German Shepherd Dog (10, 15.9%); the Siberian Husky (6, 9.5%); the Rottweiler and Labrador Retriever (4, 6.3% each); the Jagdterrier (3, 4.8%); the American Bulldog, the Schnauzer, and the Jack Russell Terrier (2, 3.2% each); the Bernese Mountain Dog, the Borzoi, the American Staffordshire Terrier, the Chihuahua, the Cane Corso, the East European Shepherd, the Central Asian Shepherd Dog, the American Pit Bull Terrier, the King Charles Spaniel, and the Samoyed (1, 1.6% each) as shown in Table 3 meet reports indicating that certain breeds are at an increased risk of severe CPV-2 infection.

Table 3 — The prevalence of canine parvovirus enteritis among various breeds of dogs at private veterinary clinic 'Health', Sumy, Ukraine (2015–2018)

No.	Breed	Number of affected dogs	Percentage, %
1	Bernese Mountain Dog	1	1.6
2	Mongrels	20	31.7
3	German Shepherd Dog	10	15.9
4	Borzoi	1	1.6
5	Siberian Husky	6	9.5
6	American Staffordshire Terrier	1	1.6
7	American Bulldog	2	3.2
8	Jack Russell Terrier	2	3.2
9	Chihuahua	1	1.6
10	Jagdterrier	3	4.8
11	Cane Corso	1	1.6
12	Rottweiler	4	6.3
13	Labrador Retriever	4	6.3
14	Schnauzer	2	3.2

No.	Breed	Number of affected dogs	Percentage, %
15	East European Shepherd	1	1.6
16	Central Asian Shepherd Dog	1	1.6
17	American Pit Bull Terrier	1	1.6
18	King Charles Spaniel	1	1.6
19	Samoyed	1	1.6

The most affected breeds are the Rottweiler, the Doberman, the American Pit Bull Terrier, the Labrador Retriever, and the German Shepherd Dog (Glickman et al., 1985; Houston, Ribble and Head, 1996; Castro et al., 2007; Shima et al., 2015). The reason for the breed's susceptibility remains unknown.

The incidence rate 73.0% (46) of unvaccinated dogs as compared to the vaccinated dogs (17, 27.0%) agrees with the report indicating that some dogs may lack the ability to stimulate immune response and overcome interference of vaccination by maternal antibodies (Nandi and Kumar, 2010; Coyne, 2000; Meers et al., 2007). Young unvaccinated or incompletely vaccinated dogs are most susceptible to the disease (Kahn and Line, 2010; Parrish, 2017). Other dogs might be affected due to poor quality and improper handling of vaccines that may lack the ability to stimulate immune response capable to protect puppy from the disease (Tizard and Ni, 1998; Schultz, 2000).

The all-year-round incidence of infection agrees with the report of Kalli et al. (2010) indicating that the breed predisposition and seasonal variation are among the risk factors of CPV infection. The recovery of 59 (93.7%) from the infection may be due to the effects of polypharmacy (Prittie, 2004; Macintire and Smith-Carr, 1997; Brown and Otto, 2008).

Conclusion. CPV infection is endemic in Sumy with a prevalence rate of 2.1% affecting young, male, exotic breed, unvaccinated and homeless more than adult, female, local, vaccinated and household dogs.

The disease occurs every month of the year affecting mongrels, the German Shepherd Dog, the Siberian Husky, the Rottweiler, the Labrador Retriever, the Jagdterrier, the American Bulldog, the Schnauzer, the Jack Russell Terrier, the Bernese Mountain Dog, the Borzoi, the American Staffordshire Terrier, the Chihuahua, the Cane Corso, the East European Shepherd, the Central Asian Shepherd Dog, the American Pit Bull Terrier, the King Charles Spaniel, and the Samoyed.

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Conflict of interest. The authors declare that there is no conflict of interest.

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