

A COMPARATIVE STUDY ON CANINE PARVOVIRUS INFECTION OF DOG IN BANGLADESH AND INDIA

M. M. Hasan¹, M. S. Jalal^{1*}, M. Bayzid¹, M. A. M. Sharif² and M. Masuduzzaman³

¹Department of Microbiology and Veterinary Public Health, ²Department of Animal Science and Nutrition,

³Department of Pathology and Parasitology, Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University, Khulshi, Chittagong, Bangladesh

ABSTRACT

A comparative study on Canine Parvovirus (CPV) infection among the hospitalized dogs at Central Veterinary Hospital (CVH) in Bangladesh and Veterinary College and Research Institute-Madras Veterinary College (VCRI-MVC) in India was conducted during a period of January and July 2015. A total of 270 (80 at CVH and 190 at VCRI-MVC) hospitalized dogs of different breeds were clinically examined. The key clinical signs observed among the CPV infected dogs were bloody diarrhoea (90.4%), vomiting (94.5%) and dehydration (severe 85.7%, moderate 10.0% and mild 7.6%). The overall prevalence of CPV infection was higher in VCRI-MVC (42.7%) than CVH (31.2%). The prevalence of CPV was varied significantly ($P<0.05$) among different age groups, vaccinated and non-vaccinated dogs. Highest prevalence was found 1-3 months (48.7%) old dogs, in compare with 4-6 months (17.2%) and over 6 months (8.3%) old dogs. Highest prevalence was also found in non-vaccinated than vaccinated dogs at CVH, Bangladesh. In VCRI-MVC, India rate of infection also varied significantly ($P<0.05$) in different age groups (57.4%, 28.9%, 10.0% among 1-3 months, 4-6 months and > 6 months respectively) and 13.2% in vaccinated and 64.4% in non-vaccinated groups. Significant ($P<0.05$) variation in prevalence of CPV also observed in different breeds- indigenous (50.0%), Spitz (28.2%), Lhasa (18.1%), Doberman (40.0%) and German Shepherd (46.6%).

Key words: CPV, CVH, VCRI-MVC, Prevalence.

INTRODUCTION

Canine parvovirus (CPV) infection is an infectious and contagious viral disease of canine especially dogs. Parvovirus comes from Latin word "Parvus" which means small and probably due to this reason this virus is known as parvovirus. It is a non-enveloped having a single stranded DNA genome belonging to the family Parvoviridae (Aappel *et al.*, 1978) CPV is genetically and antigenically unrelated to Canine Minute Virus (CnMV), formerly known as canine parvovirus type 1 (CPV-1), which is responsible for neonatal death in dogs (Tattersall *et al.*, 2005). Dogs of all age groups may be infected but puppies of 3 month of age are highly susceptible than adults (Behera *et al.*, 2015). This virus causes high morbidity (100%) and frequent mortality up to 10% in adult dogs and 91% in pups (Aappel *et al.*, 1978). Canine parvovirus (CPV) emerged in the late 1970s, probably from feline panleukopenia virus via genetic mutations and evolution (Tattersall *et al.*, 2005).

CPV infection is characterized by vomiting, diarrhea and dehydration, brownish or bloody foul smelling diarrhoea and in severe cases fever (Pollock and Coyne, 1993). The clinical manifestations of CPV infection depends on the age and immune status of the dogs, virulence of the virus, dose of the virus and pre-existing or concurrent parasitic, bacterial or virus infections (McAdaragh *et al.*, 1982) Factors that predispose parvovirus infection in puppies are lack of protective immunity, intestinal parasites, overcrowded, unsanitary, and stressful environmental conditions (Hoskins, 1997). It has been stated that Doberman, Rottweiler and German shepherd (GS) dogs seem to be more susceptible to Parvovirus infection than other breed (Ling *et al.*, 2012) Unvaccinated puppies aged between six weeks and six months are at greatest risk of developing CPV related disease (Godsall *et al.*, 2010)

The prevalence of canine parvovirus infection was reported as 77-80.4% in Thailand, 82.9% in Korea and 6% in Lithuania (Grigonis *et al.*, 2002). The outbreak of CPV disease in dogs was also reported in Belgium and France (1977), Thailand, USA(1978), Portugal, Pakistan, Italy, Spain, Germany (Lamm and Rezabek, 2008). In India 1st outbreak of CPV infection was reported in Madras (1981) and in Bombay (1985) (Haque and Arfa, 2012). Though diarrhea is one of common clinical features faced by the pet practitioners, but in Bangladesh, there is no published literature on canine parvovirus infection of dogs (Islam *et al.*, 2014).

*Corresponding e-mail address: shah.jalal.baty@gmail.com

MATERIALS AND METHODS

Location, duration of study and study population

The study was conducted at Central veterinary hospital (CVH), Bangladesh and clinics of Veterinary College and Research Institute (VCRI) and clinics of Madras Veterinary College (MVC), India; during the period of January to march 2015. The hospitalized dogs were considered as study population. Total 270 (80 at CVH and 190 at VCRI-MVC) dogs of different breeds (Indigenous and Exotic breed i.e. Spitz, Lhasa, Doberman, and GS) were clinically examined during the study period. The data related to age, sex, breed, vaccination, clinical history etc were collect from owner using a standard case report sheet. Then rectal temperature, heart rate and respiration rate was measured. Skin fold test was performed to estimate the degree of dehydration. Diagnosis is based on clinical signs. For example, in enteritis forms, signs appear within 5 to 7 days after exposure including depression, loss of appetite, high fever (above 104°F), vomition, bloody diarrhea are often seen, feces are generally light grey or yellow gray and may be streaked with blood and in myocarditis form which is usually seen in younger puppies less than 8 week of age. Dyspnea, Crying and retching finally death occur within 24 hours. Sometimes sudden death can occur without showing any cardinal signs due to Cardiac failure.

Statistical Analysis

All the data were included into microsoft office excel-2010. Then the data was cleaned, coded and finally analyzed using statistical software STATA version-13/C. Prevalence was calculated accordingly and expressed in percentage. To measure the association between categorical variables with the outcomes, chi-square test was performed with 95% level of confidence and 5% level of significance.

RESULTS AND DISCUSSION

In CVH among the 80 clinically sick dogs, 25 were found positive for CPV infection. Prevalence of different risk factors (Age, Sex, Breed, Vaccination Status, Dehydration and Diarrhea) associated with CPV disease is summarized in Table 1.

Table 1. Prevalence of CPV Infection according to different risk factors at CVH

Variables	Category level	No of observation (N=80)	Positive Case	Prevalence (%)	P value
Age	1-3 month	39	20	48.7	0.004
	4-6 Month	29	5	17.2	
	>6 month	12	1	8.3	
Sex	Male	44	16	36.3	0.275
	Female	36	9	25.0	
Breed	Indigenous	10	3	30.0	0.079
	Spitz	34	14	41.1	
	Lhasa	14	2	22.2	
	Doberman	14	3	21.4	
	GS	8	3	37.5	
Vaccination	Yes	45	4	8.8	0.001
	No	35	21	60.0	

The study revealed that, the overall prevalence of CPV infection during the study period at CVH in Bangladesh was 31.2%. The prevalence of CPV infection in different age group differed significantly ($P < 0.05$) and these were 48.7% for 1-3 months, 17.2% for 4-6 months and 8.3% for above 6 months of ages. Between two different sexes the prevalence was insignificantly ($P > 0.05$) higher in male (36.3%) than female (25.0%).

Table 2. Prevalence of CPV Infection according to different risk factors in VCRI-MVC.

Variables	Category level	No of Observation (N=190)	Positive case	Prevalence (%)	P value
Age	1-3 month	101	58	57.4	0.001
	4-6 month	69	20	28.9	
	>6 month	20	2	10.0	
Sex	Male	95	33	33.7	0.040
	Female	95	47	49.4	
Breed	Indigenous	84	42	50.0	0.001
	Spitz	39	12	30.7	
	Lhasa	22	5	22.7	
	Doberman	30	12	40.0	
	GS	15	9	46.6	
Vaccination	Yes	83	11	13.2	0.001
	No	107	69	64.4	

Among the breeds the rate of infections were encountered as 30.0% in indigenous, 41.1% in Spitz, 22.2% in Lhasa, 21.4 % in Doberman, 37.5% in GS in which were differed insignificantly ($P > 0.05$). While considering vaccination status against CPV there observed a substantial difference ($P < 0.01$) in occurrence of CPV infection which were 8.33% in vaccinated dogs and 60.0% in non-vaccinated dogs. At VCRI-MVC, in India-190 dogs were studied, of which 80 were found positive. The risk factors (Age, Sex, Breed and Vaccination Status) which influence the prevalence of CPV infection are summarized in Table 2. The estimated prevalence of CPV disease at VCRI-MVC in India was 42.1%. In compared with age wise distribution, prevalence was significant ($P < 0.05$), it was 57.4% for 1-3 months, 28.9% for 4-6 months, and 10.0% for above 6 months. Between male and female prevalence was statistically significant ($P < 0.05$) in where male 33.7%, and female 49.4%. Among the breeds of dog, prevalence were significant ($P < 0.05$) in where 50.0% for Indigenous, 30.7% for Spitz, 28.2% for Lhasa, 40.0% for Doberman and 46.6% for GS. Moreover, Vaccinated 13.2% and Non-vaccinated 64.4% were significantly ($P < 0.05$) affected with CPV infection. Table 3 represents the data of comparative study of CPV associated risk factors. It was revealed that the prevalence of different risk factors associated with CPV infections was insignificant ($P > 0.05$) between CVH and VCRI-MVC.

Table 3. Comparison on prevalence of CPV Infection between CVH, Bangladesh and VCRI-MVC, India.

Variables	Category	Prevalence (%) (Bangladesh)	Prevalence (%) (India)	P value
Age	1-3 month	48.7	57.4	0.288
	4-6 month	17.2	28.3	0.188
	>6 month	8.3	10.0	0.756
Sex	Male	36.3	33.7	0.149
	Female	25.0	49.4	0.756
Breed	Indigenous	30.0	50.0	0.685
	Spitz	43.3	30.7	0.820
	Lhasa	22.2	22.7	0.897
	Doberman	21.4	40.0	0.999
	GS	37.5	46.6	0.472
Vaccination	Vaccinated	8.8	13.2	0.464
	Non-vaccinated	60.0	64.4	0.633

Table 4. Different clinical signs observed among the CPV Infection in dogs.

Variables	Category	No of Observation (N)	Positive case (N)	%
Bloody	Yes	105	100	90.4
Diarrhea	No	165	5	3.0
Vomition	Yes	110	104	94.5
	No	160	1	.6
Dehydration	Severe	105	90	85.7
	Moderate	100	10	10
	Mild	65	5	7.6

Study revealed that in 90.4% bloody diarrhea, 94.5% vomition and 85.71% Severe, 10.0% moderate, 7.6% mild dehydration present in CPV infection (positive) in dogs.

The study revealed an overall prevalence of CPV infection in suspected dogs in CVH was 31.2%. The result is an agreement with other reports that prevalence of canine parvovirus infection in street Dogs, at Mymensingh metropolitan City, in Bangladesh was 30.0% (Islam *et al.*, 2014). Overall prevalence of CPV infection in suspected dogs in VCRI-MVC, India was 42.1%. Similar findings were reported previously where prevalence was 40.8% (Behera *et al.*, 2015). Prevalence of CPV infection is higher in India than Bangladesh. This might be occur due to presence of endemic infection in the population under study at VCRI-MVC in India. Prevalence of CPV infection was higher among 1-3 month of age group than other age groups which support the study conducted by Vivek (2011). Again younger puppies (≤ 3 months) is mostly affected which might be due to the affinity of the virus being multiplying rapidly at intestinal crypt cells at the weaning age along with higher mitotic index. Prevalence of CPV infection below 3 month of age puppies was insignificantly higher in VCRI, MVC than CVH. Once again in CVH, prevalence of CPV infection was slightly higher in male (36.3%) compared with female (25.0%). The study was in agreed with Islam *et al.* (2014). Oppositely female dogs were higher in susceptible (49.4%) than the male (33.7%) in VCRI-MVC, supported by finding of Umar *et al.* (2015). The susceptibility of Female was higher in CPV infection (India) however in Bangladesh male was higher in susceptible, it was due to most of the Indian people kept female for breeding purpose than Bangladeshi people. Breed wise distribution shown that prevalence of CPV disease was more in exotic breed than local indigenous in CVH. Among the exotic breeds Spitz, GS, Doberman were more susceptible. Among the breeds in VCRI-MVC, The occurrence of CPV infection is significantly higher in Local indigenous than the exotic breeds which is supported by research findings of Shukla *et al.* (2009). This study also exposed that among the exotic breeds GS, Doberman were higher in susceptibility than the others breed due to inherited immunodeficiency. It was supported by Singh *et al.* (2013), where CPV infection was highest in German shepherd (70%), followed by Doberman (55%). In CVH, Spitz was more susceptible due to its small size & most preferable breed in Bangladeshi people. In MVC-VCRI Local indigenous dogs were higher susceptible due to higher population density of this breed, poor vaccination and lack of awareness. Among exotic breed GS, Doberman were highly susceptible. In non-vaccinated dogs the prevalence was higher in compared with vaccinated one. The finding was agreed with finding of Godsall *et al.* (2010) where unvaccinated puppies aged between six weeks and six months are at greatest risk of developing CPV infection. The higher prevalence of CPV infection in Non-vaccinated dogs in due to Lack of protective immunity. In vaccinated dogs there was also presence of CPV infection this might be occurred due to, incomplete or ineffective primary vaccination course, or failure of vaccination. The study was performed on the basis of tentative diagnosis by observing clinical signs and symptoms. The main clinical signs of CPV disease are Bloody diarrhea, Vomition, Dehydration. The study findings were an agreement with findings of Prittie (2004) and Thomson & Gagnon (1987). In 90.4% and 94.5% CPV positive dogs, there were presence of bloody diarrhea and vomition (Table 5). Similar finding was also reported by Thomson and Gagnon (1978). About 85.7% CPV positive dogs were severe dehydrated that was reported in previous study, as an important sign of CPV infection (Laforcade *et al.*, 2003).

In conclusion, canine Parvovirus is an infectious and highly contagious viral disease of dogs. Dogs of all age groups are infected but puppies age less than 3 month are highly susceptible than adults. Both male and female can be infected with CPV. Both indigenous and exotic breed (German shepherd, Doberman, Spitz, Lhasa), are susceptible to CPV infection. The rate of infection is high in non-vaccinated than vaccinated dogs. The prevalence of this disease is higher in India than Bangladesh.

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