

**RETROSPECTIVE STUDY OF THE PREVALENCE AND PATTERN OF PARVOVIRAL  
ENTERITIS PRESENTED AT THE VETERINARY TEACHING HOSPITAL,  
UNIVERSITY OF IBADAN, NIGERIA.**

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**ABSTRACT**

Canine Parvovirus Enteritis remains a significant cause of mortality and morbidity in dogs in Nigeria. To assess its prevalence and pattern of occurrence, case records of dogs presented with gastroenteritis at the Veterinary Teaching Hospital, University of Ibadan, within a 10-year (2005-2015) period were evaluated and cases confirmed as parvoviral enteritis were selected. The age, sex and breeds of the affected dogs and the annual occurrence pattern were noted. Most of the cases presenting with signs of gastroenteritis (61%) were confirmed to be due to parvovirus. Occurrence was higher in the dry season and female dogs were more affected (52%) and most of the confirmed cases (80%) were under one year of age. The Rottweiler, Alsatian and Boerboels breeds were the most affected. This study highlights parvovirus as a significant cause of gastroenteritis in dogs, the dog population more predisposed and the seasonal pattern of its occurrence in Ibadan, Nigeria.

**KEYWORDS:** Parvovirus, Enteritis, Dogs, Gastroenteritis, Ibadan.

**INTRODUCTION**

Canine Parvovirus (CPV) is a leading cause of gastroenteritis in dogs. It was first recognized in 1978 with a rapid spread worldwide in few years (Carmichael, 2005). They are extremely stable and resistant to adverse environmental influences (Greene and Decaro, 2012). It is a hardy and highly contagious virus that remains a cause of significant disease process especially in young dogs (Savigny and Macintire, 2010). It is estimated that over one million dogs are affected each year in the United States (Otto et al., 2001) despite the availability of effective vaccines.

Parvoviruses (Parvoviridae) are small, single-stranded, non-enveloped, DNA viruses (Prittie, 2004, Mccaw and Hoskins, 2006) and they that require rapidly dividing cells to replicate (Greene and Decaro, 2012). There are two types of CPV: Type 1 and 2. CPV-2 is the dominant strain that causes classical parvoviral enteritis. Parvovirus is less likely to affect dogs older than six months because of their immunity through natural infection or immunization (Prittie, 2004). Neonatal puppies from vaccinated dams are likely to be protected by the maternal antibodies for the first few weeks of life (Tabor, 2011). These antibodies are transferred to puppies through colostrum; the antibody titre of a puppy depends on the serum titer of the bitch at whelping, the size of litter and the amount of colostrum absorbed by the puppy (Prittie, 2004). CPV-2 is most commonly

spread via the fecal-oral route and the fecal-nasal route. After replication, the virus attacks rapidly dividing cells such as those in the lymphoid tissue, thymus, intestinal epithelium, bone marrow, and heart (Tabor, 2011). CPV infection is characterized by anorexia, vomiting, bloody diarrhea, lethargy, myocarditis and leucopaenia (Streck et al., 2009, Tabor, 2011). The clinical signs can vary depending on how long the dog has been infected and the severity of the infection (Rewerts and Cohn, 2000). The severity depends on the amount of viral inoculum received, the virulence of the strain, and the host's immune response (Rewerts and Cohn, 2000).

As there is no specific antiviral agent approved for treating CPV infection (Tabor, 2011), therapy remains mainly supportive and aimed at controlling the clinical signs of disease (Savigny and Macintire, 2010). The restoration of fluid volume and electrolyte balance is very important, especially in puppies that have had severe vomiting and diarrhea. Without treatment of CPV infection, mortality rate can be as high as 91%; with aggressive treatment, the mortality drops to 4% to 48% (Prittie, 2004).

Immunization is the most effective prevention of CPV infection. Determination of the most effective age of immunization depends on several factors including the antibody titer of the bitch and the immunogenicity and antigen titer of the vaccine (Mccaw and Hoskins, 2006).

Interference by maternal antibodies is the main reason for vaccine failure therefore it is important that antibody titer is checked before vaccination and re-vaccination (Prittie, 2004).

This retrospective study aims at assessing the prevalence and pattern of parvoviral enteritis managed at the VTH, University of Ibadan.

## MATERIALS AND METHODS

The Veterinary Teaching Hospital, University of Ibadan (VTH, U.I.) (7.4417° N, 3.9000° E) is a tertiary animal health delivery facility in Ibadan, Oyo state, Nigeria, which is equipped for diagnostics and clinical services. It also serves the training of veterinary students in the University of Ibadan. The hospital has a large client base and handles referral cases from neighboring cities and regions of Nigeria.

Case records of dogs presented with gastroenteritis within a 10-year period (2005-2015) were studied. Diagnosis was based on clinical history, physical or clinical examination, hematological examination, serum biochemistry and parvovirus virus antigen detection in fecal samples using rapid test kits (IDEXX SNAP Parvovirus antigen detection kit). The prevalence and pattern of distribution of CPE among the reviewed cases was noted and data on age, sex and breeds of the affected dogs with the annual occurrence pattern were analysed and presented using descriptive statistics.

## RESULTS

A total of 168 cases of gastroenteritis were presented to the Veterinary Teaching Hospital within the period of this study. The aetiologies of gastroenteritis in dogs presented to the clinic during the study period were confirmed to be majorly due to parvovirus infection (61%), helminthes (17%), protozoa (2%), and other causes such as poisoning, canine distemper and bacteria enteritis (20%) (Figure One). Canine Parvoviral Enteritis (CPE) was observed to affect dogs almost all year round but with high prevalence in the dry season (December to March) and peak in February (Figure Two). A yearly variation in the number of cases presented to the Hospital was observed (Figure Three) with Female dogs being more affected (52%) than males (36%) (Figure Four). The age distribution of dogs presented with CPE shows a higher occurrence in dogs younger than one year of age (80%) than those older than one year (10%) (Figure Five) and the observed breed prevalence of CPE showed the highest occurrence in Rottweiler, followed by Alsatian and Boerboel, its occurrence is low in Labrador and pitbull and least in Neopolitan mastiff, Caucasians and crossbreeds (Figure Six). Majority of the dogs 90% presented had history of anorexia, fever, weakness, diarrhea and vomiting while 10% had only fever, anorexia and watery diarrhea. Mortality in puppies that had lost a lot of blood, fluid and electrolyte was between 90-100% but those presented earlier and given prompt and adequate care had 65 -70% survival rate, while adult

dogs presented early to the clinic and given adequate treatment and supportive care had 70-75% survival rate. About 83% of dogs presented had history of prior vaccination while 17% had doubtful vaccination history. Of the 83% that had history of vaccination, 55% were not sure of the type of multivalent vaccines (i.e. Distemper, Hepatitis, Leptospirosis, Parvovirus and Parainfluenza vaccines – DHLPPi) used and the vaccination protocol followed by the clinician that vaccinated the dogs, as most of these cases were referral cases to the Teaching Hospital.

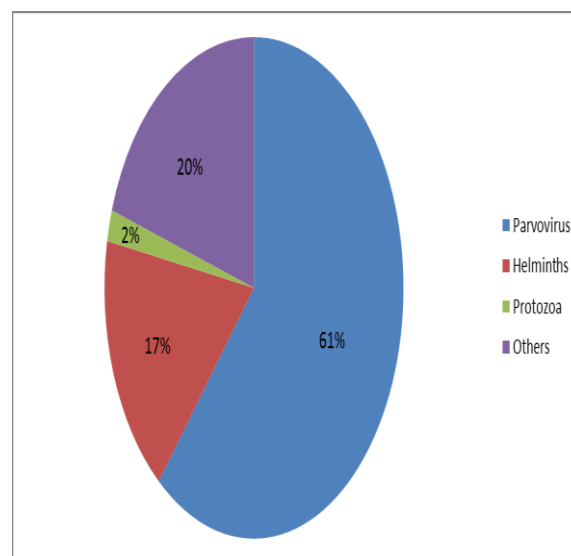


Figure One: Identified causes of gastroenteritis in cases presented at the Veterinary Teaching Hospital, University of Ibadan, Nigeria (2005-2015).

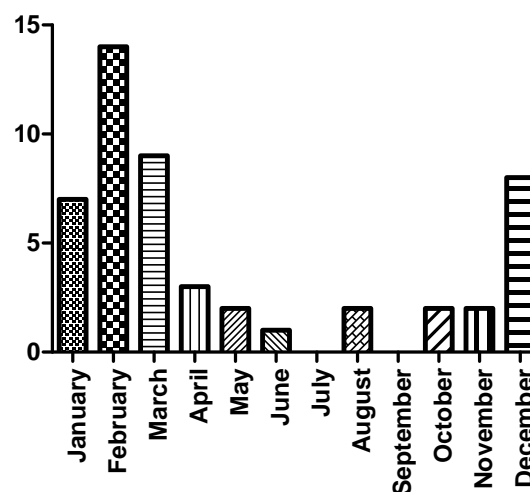
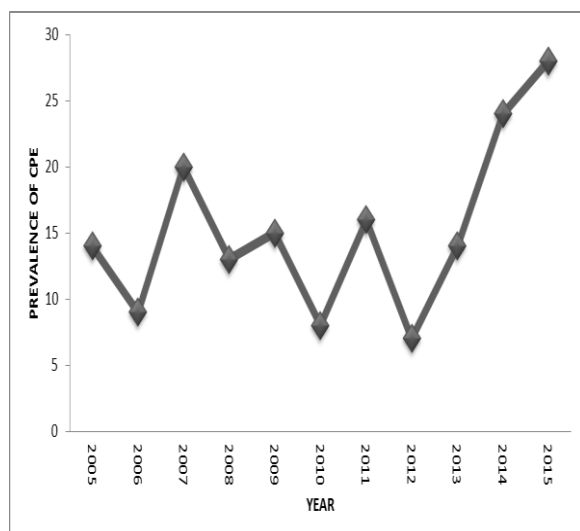
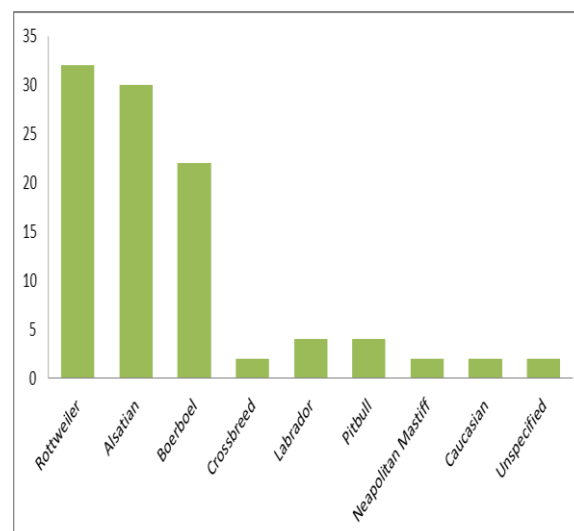


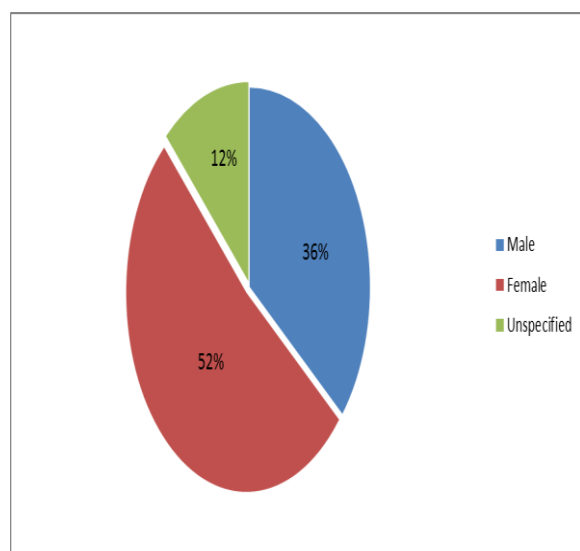
Figure Two: Average monthly distribution of Parvoviral enteritis in dogs at the VTH, U.I. (2005-2015).



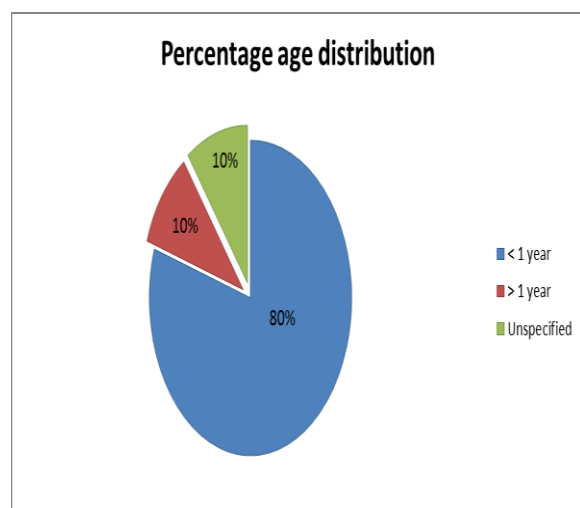
**Figure Three: Yearly variation in Canine Parvoviral Enteritis cases presented to the Veterinary Teaching Hospital, University of Ibadan (2005-2015).**



**Figure Six: Breed prevalence of canine parvovirus enteritis at the Veterinary Teaching Hospital**



**Figure Four: Sex distribution of dogs with gastroenteritis due to parvovirus.**



**Figure Five: Percentage age distribution of dogs presented with parvoviral enteritis**

## DISCUSSIONS

This retrospective study reveals that Canine Parvoviral Enteritis is a leading cause of morbidity and mortality in young dogs in Nigeria. A high percentage (61%) of dogs with signs of gastroenteritis was confirmed to be due to CPV. This agrees with the finding of Greene and Decaro (2012) that Canine Parvoviral Enteritis is one of the most common infectious disorders of dogs and the most prevalent virus in dogs with infectious diarrhea. A lower prevalence of 13.4% was however obtained in a similar study in a primary animal health care facility in Nigeria (Shima *et al.*, 2015).

It was also found that some other causes of gastroenteritis in dogs from this study include helminth infections in seventeen percent (17%) of the dogs presented while two percent (2%) was due to protozoa infection such as Isosporosis. Others causes of gastroenteritis (20%) were bacterial infection, poor hygiene, dietary indiscretion and poisoning. These other causes may also co-exist with CPV, thereby increasing the severity of the gastroenteritis and mortality rate. According to Greene and Decaro (2012) clinical illness is most severe in young, rapidly growing pups that harbor intestinal helminths, protozoa and certain enteric bacteria such as *Clostridium perfringens*, *Campylobacter* spp. and *Salmonella* spp., thereby raising the death rate in affected dogs.

From this study, CPE occurred almost all year round with peak periods in the dry season and a lower incidence during the rainy season. The number of CPE cases increased from December to reach the peak in while from March to May, the number of cases reduced to reach a minimum in June. There were no cases presented in July and September. A similar pattern had been reported in Nigeria (Shima *et al.*, 2015). Comparable studies in the temperate climate, showed a distinct seasonality in the occurrence of CPE, with peak incidence of disease during summer months and a trough

during winter (Houston *et al.*, 1996, Shakespeare, 1999). Since CPVs are non-enveloped DNA viruses and are extremely stable and resistant to adverse environmental influences (Greene and Decaro, 2012). The seasonal variation may therefore, not be entirely associated with variation in weather but also with breeding in dogs as it was discovered that the seasonality of CPE coincides with the season most indigenous dogs breed in Nigeria. At this time, local dogs have tendency to stray and congregate in large number from different places. This practice increases the risk of spreading the disease among such dogs. The cause of seasonal variation among the exotic breeds that do not stray or congregate for mating is however unknown. CPE is easily spread during courtship when males and females run together and male sniff the perineal area of females in an attempt to recognize heat. Spread of this infection is enhanced at this time because CPV is highly contagious, and transmission occurs as a result of contact with contaminated faeces in the environment, through contaminated hair coat, fomites, insects, and rodents (Greene and Decaro, 2012).

The occurrence is further increases at the breeding period as more susceptible puppies are available. The immunity to CPV following infection or vaccination is long lived, and therefore the only susceptible pool of dog is the puppies born into the population (Goddard and Leiswitz 2010). They may be exposed due to lack or inadequate transfer of colostrum to neonates, interference of maternal antibodies with vaccination or ineffective vaccination.

From this study, most of the dog owners indicated that their dogs were vaccinated but did not know the types of vaccine used, the vaccination regimen and handling of the vaccines before the vaccination. Poor vaccine quality, irregular or incomplete vaccination programme, lack of maintenance of cold chain and poor storage of vaccine as a result of erratic power supply may cause vaccination failure. This agrees with the report of Tizzard and Yawei, (1998) and Schultz, (2000) that vaccine failure result from interference of vaccine immune response by maternal antibody and improper handling of vaccines.

Female dogs had higher incidence (52%) than male (36%) in this study. This finding is contrary to the finding by Shima *et al.*, 2015 where male dogs had higher incidence (57.8%) than female (42.2%). Castro *et al.*, 2007, in their own study, however found no significant difference in exposure to CPV in both sexes. It may therefore be inferred that exposure to CPV is not influenced by gender.

This study shows that most of the infected dogs (80%) were less than one year old, ten percent (10%) are more than one year old while ten percent are unspecified due to incomplete record. Similarly, previous researches have reported that acute CPV-2 enteritis could be seen in dogs of any breed, age, or sex, but puppies between six weeks

and six months of age appear to be more susceptible (Pollock and Coyne, 1993; Hoskins, 1997; Prittie, 2004). Shima *et al.*, (2015) found that puppies of 0-5 months had highest number 60.3% of CPV infection with dog of six-11 months and one year and above having 27% and 12.7% respectively. Other studies by Castro *et al.*, 2007 and Cubel *et al.*, 2014 showed that puppies of 2-4 months are at higher risk than older dog. This may be due to poor immune status of dam and lack of MDA in puppies or improper timing of vaccination in puppies with MDA resulting in CPV vaccine antigen neutralization and vaccine failure (Pollock and Carmichael, 1982).

From this study, we found that Rottweiler, Alsatian, Boerboel were more frequently affected by CPE. The occurrence is lower in Labrador and Pitbull and least in Neopolitan Mastiff, Caucasian, and cross breeds. This finding is consistent with the report of Glickman *et al.*, 1985 and Gombac *et al.*, 2008 that found Alsatian, Doberman pinscher and Rottweiler to be at high risk of developing CPE. Greene and Decaro, (2012) also reported that Rottweiler, Doberman Pinschers, Labrador retrievers, American Staffordshire terriers, German shepherds and Alaskan sled dogs have high risk of CPV infection.

The primary goal of treatment of CPV include restoration of fluid and electrolyte balance preventing secondary bacterial infection (Greene and Decaro, 2012). The treatment protocol adhered to at the VTH, University of Ibadan centers on prevention of secondary bacterial infection and the maintenance of fluid and electrolyte balance. It has been documented that with proper treatment and supportive care, survival rate of infected dogs vary from 68-95 % (Prittie, 2004). This is similar to our findings of 70-75% survival rate in well managed cases presented to the clinic early enough.

CPE is best prevented by vaccination. The vaccination protocol being used at the clinic makes use of DHLPPi which contains inactivated or attenuated CPV as one of the constituents and it is administered at six weeks of age and two booster doses given at four weeks intervals for adequate immune response. This practice agrees with the recommendation of (Shima *et al.*, 2015) that administration of inactivated CPV will be protective for dogs and will reduce mortality and morbidity due to CPE. However, live vaccines may reverse to virulence and cause clinical infection (Greene and Decaro, 2012). Hence care should be taken in storage, handling, and administration of the vaccines to ensure protection of the vaccinated dogs.

## CONCLUSION

From this study we conclude that CPV is a major aetiology of canine gastroenteritis in Nigeria. It usually affects dogs less than one year old with a seasonal pattern of occurrence which coincides with the period more dogs breed in Nigeria. There is therefore need for



seasonal preparedness and intensified research to know the cause of vaccine failures currently experienced. Good biosecurity measures, proper hygiene, vaccination practice and routine CPV antibody seromonitoring are recommended.

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