Journal of Sustainable Veterinary & Allied Sciences
P-ISSN-2695-2661 e-ISSN: 2811-1346
JoSVAS 2022, Vol 2, Issue 2: 62-66

Original Research Article

# Assessment of clinical management of Canine Parvoviral enteritis in South East, Nigeria

**[1*]Ukwueze, C.S., [2]Kalu, E., [1]Ememe[1] M.U., & [3]Unigwe, R.C.**

*[1]Department of Veterinary Medicine, [2]Department of Veterinary Public Health and Preventive Medicine, [3]Department of Veterinary Biochemistry and Animal Production, Michael Okpara University of Agriculture, Umudik, Nigeria.*

*Corresponding author: ukwueze.chigozie@mouau.edu.ng, +2348030793359

## ABSTRACT

Canine parvoviral enteritis (CPE) is a highly contagious disease, infecting dogs mainly from six weeks to six months. In this study, one hundred and fifty well-structured questionnaires were used to assess the clinical management of Canine Parvoviral Enteritis (CPE) among Consultants, Clinicians and dog owners/breeders. The study revealed that 78 % of the cases were managed in clinics/hospitals, with 59.3% hospitalization and with a success rate of 58.6 %. The study also revealed that younger dogs 1-6 months were more affected and both sexes are susceptible to CPE. Exotic breeds were mostly affected by CPE (96.6%). Most clinicians (73.3%) did not know the CPV-2 strain most prevalent in their area of practice while 52. 6% were not aware of CPV-2 strain in the vaccine they use for their practice. We therefore, recommend that vaccines containing the predominant antigenic CPV-2 variant circulating in a geographical area be used to vaccinate dogs.

.**Keywords:** Clinical, CPE, CPV-2, management, strain, dog

## INTRODUCTION

Dog has become indispensable in man's life as an embodiment of love and affection. Their utility ranges from companionship, tracking, hunting, war fare, bomb and explosives detection, anti-crime, guiding blind people, meat delicacy and religious rituals (Carmichael, 2003). Dogs also help to lower stress as companions. They alleviate loneliness, improve health by encouraging people to exercise more and enjoy outdoors. In view of the need for dogs in our society, it is necessary to study the various diseases that affect their wellbeing, production and productivity such as canine parvoviral enteritis (CPE), which has become an important problem to dog population worldwide (Carmichael, 2005).

Canine parvoviral enteritis is a severe gastrointestinal disease of dogs, affecting mostly dogs younger than six months of age (Kalli *et al.* 2010; Marcovich *et al.* 2012). It is caused by antigenic variants of canine parvovirus type 2 (CPV-2), which is a highly contagious viral disease of dogs (Appel *et al.*, 1979). It is of great concern to pet owners, practicing veterinarians and scientists due to its high morbidity and mortality rates (Ukwueze *et al.*, 2020). The disease is transmitted by direct and indirect contacts with contaminated feaces, bedding or fomites (Appel *et al.*, 1979). Canine parvoviral enteritis infection is initially manifested as nonspecific symptoms, such as fatigue, fever, dehydration, and inappetence, which often develop into vomiting and haemorrhagic diarrhoea with a foul smell or distinct odour, within 24-48 hours after development of clinical signs (Aiello *et al.*, 2012; Johnson 2014).

Treatment of CPE is largely supportive and focuses mainly on stabilizing fluid and electrolyte concentrations, and controlling clinical signs. Survival depends on how quickly diagnosis is made, age of the animal and institution of aggressive therapy (Johnson, 2014). Thus this work was designed to assess treatment protocols in clinical management of canine parvoviral enteritis, create awareness on the most prevalent strain and vaccine strains of CPV-2, and make appropriate recommendations to clinicians and dog owners.



http://doi.org/10.54328/covm.josvas.2022.055

## MATERIALS AND METHODS

The study was carried out among Veterinary doctors, Consultants, Clinicians, Technologist and dog breeders/owners. One hundred and fifty (150) well-structured questionnaires were administered to the study population. The questionnaires bordered on clinical management of canine parvovrial enteritis, predisposing factors and awareness on the vaccine strains and the prevalent strains of CPV-2 circulating. Data obtained were analysed using SPSS version 20 and were summarized as frequencies and percentages while Chi square was used to establish the degree of association between the variables.

## RESULTS

Majority of the respondents were Consultants/clinicians (Veterinary Doctors: 74%) and 26% were dog breeders/owners. They were mostly male (82%), while female respondents were (18%) which differed significantly ($P<0.05$). The percentage frequencies of other variables, including the clinical management and risk factors of canine parvoviral enteritis, are summarized in Tables I and II, respectively.

**Table 1: Clinical management of Canine Parvoviral Enteritis among 150 respondents who are Consultants, Clinicians and dog owners/breeders**

| Variables | Frequencies (n= 150 ) | (%) |
|---|---|---|
| **Where was the case treated?** | | |
| At home by self | (33) | (22) |
| Home call by a Veterinarian | - | - |
| Visited a clinic/ hospital | (117) | (78) |
| Unorthodox (local) | - | - |
| **Was the dog hospitalized?** | (89) | (59.3) |
| Yes | (61) | (40.6) |
| No | | |
| **Duration of treatment** | | |
| A day | - | - |
| 2 days | - | - |
| 3days | (16) | (10.6) |
| 4days | (17) | (11.3) |
| 5 days | (69) | (46) |
| > 5days | (48) | (32) |
| **Route of infusion** | | |
| IV | (96) | (64) |
| SC | - | - |
| Both | (54) | (36) |
| **Type of fluid** | | |
| Dextrose saline | (75) | (50) |
| Normal saline | (12) | (8) |
| Darrows' solution | - | - |
| Lactated ringers | (63) | (42) |
| **Antibiotics** | | |
| Gentamycin | (50) | (33.3) |
| Pen-strep | (21) | (14) |
| Sulphadimidine | (17) | (11.3) |
| Ceftrixone | (42) | (28) |
| Others | (20) | (13.3) |
| **Antiemetic** | | |
| Metochlopromide | (104) | (69.3) |
| Promethazine | (33) | (22) |
| Chlopromazine | (13) | (8.6) |
| **Were you satisfied with the treatment given to the dog?** | | |
| Yes | (137) | (91.3) |
| No | (13) | (8.6) |
| **How many dogs have you lost due to Canine Parvoviral Enteritis?** | | |
| 1-5 | (102) | (68) |
| 6-10 | (21) | (14) |
| 11-15 | (16) | (10.6) |
| 16-20 | (11) | (7.3) |
| >20 | - | - |
| **Success rate in the management of clinical Canine Parvoviral Enteritis** | | |
| 20 % | - | - |
| 40% | (18) | (12) |
| 60% | (88) | (58.6) |
| 80% | (44) | (29.3) |
| 100% | - | - |
| **Late presentation is a major cause of death in CPE** | | |
| Strongly disagree | (9) | (6) |
| Disagree | (17) | (11.3) |
| Strongly agree | (77) | (51.3) |
| Agree | (47) | (31.3) |
| **Inability to come for follow up is one of the causes of death in CPE** | | |
| Strongly disagree | (17) | (11.3) |
| Disagree | (13) | (8.6) |
| Strongly agree | (50) | (33.3) |
| Agree | (70) | (46.6) |
| **Lack of funds to pay for treatment is a factor contributing to death in CPE** | | |
| Strongly disagree | (9) | (6) |
| Disagree | (33) | (22) |
| Strongly agree | (42) | (28) |
| Agree | (66) | (44) |

**Table II: Risk factors associated with the occurrence Canine Parvoviral Enteritis among 150 respondents who are Consultants, Clinicians and dog owners/breeders**

| Variables | Frequencies (n = 150) | (%) |
|---|---|---|
| **Ages of dogs are mostly affected** | | |
| 0-3 months | (66) | (44) |
| 4-6 months | (48) | (32) |
| 7-12months | (27) | (18) |
| > 1year | (9) | (6) |
| **Sex of dogs mostly affected** | | |
| Male | (5) | ( 3.3) |
| Female | (12) | (8) |
| Both | (133) | (88.6) |
| **Breeds of dogs mostly affected** | | |
| Exotic breeds | (145) | (96.6) |
| Local breeds | - | - |
| Mixed breeds | (5) | (3.3) |
| **Seasons of out breaks of infection** | | |
| January-March | (73) | (48.6) |
| April-June | (25) | (16.6) |
| July-September | (12) | (8) |
| October-December | (40) | (26.6) |
| **Vaccination status of affected dogs** | | |
| Vaccinated | (50) | (33.3) |
| Unvaccinated | (77) | (51.3) |
| Unknown | (23) | (15.3) |
| **The most prevalent strain of the virus** | | |
| CPV-2a | (11) | (7.3) |
| CPV-2b | (10) | (6.6) |
| CPV-2c | (19) | (12.6) |
| No idea | (110) | (73.3) |
| **The strain(s) of virus present in the vaccine** | | |
| Original CPV-2 | (26) | (17.3) |
| CPV-2a | (14) | (9.3) |
| CPV-2b | - | - |
| CPV-2c | - | - |
| CPV- 2c and then 2a/2b | (31) | (20.6) |
| No idea | (79) | (52.6) |

## DISCUSSION

Management of CPE is mainly symptomatic and supportive until clinical signs of vomiting and diarrhoea are resolved (Mazzaferro, 2020). Common duration of treatment in this study was 5 days (46%) and this agrees with the findings reported by Mylonakis *et al.* (2016) who observed that the duration of treatment depends on the severity, requiring hospitalization in more severe cases, but usually averages five days. Intravenous (IV) fluid administration is the most aggressive and reliable therapy for CPE as it restores intravascular fluid volume status, replenishes interstitial fluid losses, and maintains hydration (Jonhson, 2014; Mazzaferro, 2020) and this was observed in this study as 64% of respondents used this method of treatment. As seen in table 1, 50% and 42% of respondents used dextrose and lactated ringers solution respectively for their IV infusion. This percentage is quite low due to the effectiveness of lactated ringers solution in the treatment of CPE because according to Anastasio *et al.,* (2014) and Mylonakis *et al,* (2016), the fluid of choice indicated for CPE is lactated ringers a balanced isotonic crystalloid solution and dextrose solution. The other ancillary therapies are broad-spectrum antibiotics, to prevent secondary bacterial infections and bacterial translocation. As observed in this study, various antibiotics depending on availability have been indicated for the treatment of CPE (Sykes, 2010; Duijvestijn *et al.,* 2016; Botha *et al.,* 2018). Antiemetics and gastroprotectants are used to minimize fluid loss, analgesia and nutritional support are also essential factors for the best treatment outcome (Mazzaferro, 2020).

In this study area, 60% success rate in management of CPE was observed from the respondents. Previous studies have reported 80% success rate in early diagnosis with aggressive therapy and nursing care (Otto *et al.,* 2001; Mylonakis *et al,* 2016). This study also identified late presentation (51.3%) as factor contributing to mortalities in management of CPE. Survival rate in CPE infection depends on how early the disease is diagnosed, age of the animal and institution of aggressive therapy (Johnson, 2014). Inadequate follow up and cost of treatment were also identified in this study as factors leading to mortalities in CPE infection (Table 1). As also observed in this study, costs of hospitalization and treatment have been previously reported as the primary challenges and limiting factors for dog owners in the treatment of CPE (Mazzaferro, 2020).

The ages of dogs that were mostly affected was 0-3 months (44) and 4-6 months (32), which were significantly higher than those of the other age groups. This result corroborates with previous researchers Kalli *et al.* (2010) and Marcovich *et al.* (2012), who reported that CPE occurs mainly in younger dogs less than six months of age and adult dogs with insufficient immunity. The result of this study showed no variation in the sex of dogs affected with CPE. The observation is in agreement with other researchers (Castro *et al.,* 2007; Ukwueze *et al.,* 2019), who did not observe any difference in the sexes of dogs affected with CPE. Seasonally, outbreaks of CPE occurred mostly between the months of January to March (48.6%) while October to December had a frequency of occurrence of 26.6%. Several studies have reported that CPE, infections normally peaks in

November, December, January and February (Shima *et al.*, 2015; Adejumobi *et al.*, 2017; Francis *et al.*, 2019). Exotic breeds of dogs (96.6%) were mostly affected by CPE in this study and this agrees with other researchers (Houston *et al.*, 1996; Ling *et al.*, 2012; Ukwueze *et al.*, 2019), who stated that exotic breeds of dogs are more susceptible to CPE than local breeds. Most of the dogs in this survey were unvaccinated dogs (51.3%), while only (33.3%) were vaccinated. Several studies (Kingborg *et al.*, 2002: Ukwueze *et al.*, 2019) have reported outbreaks of CPE in both vaccinated and unvaccinated dogs. This is probably due to the inability of the immune system to respond to the vaccines possibly due to improper storage, poor quality vaccine, incomplete vaccination or antigenic variations as a result of mutation (Decaro *et al.*, 2009; Nnadi and Kumar, 2010).

It was also observed from the study, that 73.3% of the respondents did not know the strain of CPV-2 predominant in their area of practice and 52.6% of respondents were not aware of the strain of the virus present in the vaccines they use (Table 2). The identification of antigenic variants of CPV-2 currently circulating in canine population is essential for understanding of the viral evolution and development of control measures (Pinto *et al.*, 2012). Currently there are three antigenic variants of the virus, namely CPV-2a, CPV-2b and CPV-2c circulation in various parts of the world (Fagbohun & Omobowale, 2018). Several workers have detected CPV-2c as the most prevalent strain in Nigeria (Shima *et al.*, 2020, Ukwueze *et al.*, 2020), whereas most of the available vaccines are either of original CPV-2 or 2a/2b variants (Ukwueze *et al.*, 2020). It has been widely speculated that for effective control of CPV-2, the vaccines used should contain the latest antigenic variant of the virus circulating in the geographical area (Truyen, 2006). Although some previous workers (Decaro *et al.*, 2008; Decaro *et al.*, 2009) have observed cross protection of immunity after vaccination, recent studies disagree as vaccinated dogs with different vaccine strain got infected with 2c strain (Decaro & Buonavoglia, 2012; Ukwueze *et al.*, 2020).

## CONCLUSION AND RECOMMENDATION

Clinical management of CPE is largely supportive, thereby restoring the electrolyte disruptions due to vomiting and diarrhoea. Clinicians need to be aware of the CPV-2 antigenic variants circulating in their area of practice and the antigenic variant of CPV-2 in the vaccines they use. We therefore, recommend that vaccines containing the predominant antigenic CPV-2 variant circulating in Nigeria be used to vaccinate dogs.

## REFERENCES

Adejumobi, O.A., Omotosho, O.O., Omobowale, T.O. & Akinrinmade, J.F. (2017). Retrospective Study Of the prevalence and pattern of parvoviral enteritis presented at The Veterinary Teaching Hospital, University Of Ibadan, *Nigeria. European Journal of Pharmaceutical and Medical Research*, 4(3), 109-113.

Aiello, S.E., Moses, M.A. & Steigerwald, M.A. Canine Parvovirus. In: The Merk Veterinary Manual Online. https://microbewiki.kenyon.edu/index.php, 2012; retrieved 28-01-2017.

Anastasio, J.D., Fletcher, D.J. & Rozanski, E.A. (2014). Crystalloid fluid therapy. In: Bonagura JD, Twedt DC, editors. *Kirk's Current Veterinary Therapy XV*. 15th ed. St Louis, MO: Elsevier; 2014:2–7.

Appel, M.J.G., Scott, F.W. & Carmichael, L.E. (1979). Isolation and immunisation studies of a canine parvo-like virus from dogs with haemorrhagic enteritis. *Veterinary Record*, 105:156-159.

Botha, W.J., Schoeman, J.P. & Marks, S. L. (2018). Prevalence of salmonella in juvenile dogs affected with parvoviral enteritis. *Journal of the South African Veterinary Association*, 89, 1–6.

Carmichael, L. E (2003). Canine infectious diseases-A personal perspective. Proceedings in the international symposium on "Reunion Mundial de Lideres en la Education Veterinaria" that commemorated the 150th anniversary of veterinary education in the college of veterinary medicine, National autonomous university of Mexico: August 16th 2003, at D.F. Baker Institute for Animal Health, Cornell University, Ithaca, New York, USA.

Carmichael, L.E. (2005). An annotated historical account of canine parvovirus. *Journal of Veterinary Medicine B* 52, 303–311.

Castro, T.X., Miranda, S.C., Labarthe, N.V., Silva, L.E. & Cubel Garcia, R.C.N. (2007). Clinical and epidemiological aspects of canine parvovirus (CPV) enteritis in the State of Rio de Janeiro: 1995-2004. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, 59 (2): 333-339.

Decaro, N., Cirone, F., Desario, C., Elia, G., Lorusso, E., Colaianni, M.L., Martella, V. & Buonavoglia, C. (2009). Severe parvovirus in a 12-yearold dog that had been repeatedly vaccinated. *Veterinary Record*, 164, 593–595.

Decaro, N., Desario, C., Elia, G., Martella, V., Mari, V., Lavazza, A., Nardi, M. & Buonavoglia, C. (2008). Evidence for immunisation failure in vaccinated adult dogs infected with canine parvovirus type 2c. *New Microbiology*, 31, 125–130.

Decaro, N. & Buonavoglia C. (2012). Canine parvovirus—A review of epidemiological and diagnostic aspects, with emphasis on type 2c. *Veterinary Microbiology*, 155,1–12.

Duijvestijn, M., Mughini-Gras, L. & Schuurman, N. (2016). Enteropathogen infections in canine puppies (co)occurrence, clinical relevance and risk factors. *Veterinary Microbiology* 195:115–22.

Fagbohun, A.O. & Omobowale, T.O. (2018). Sequence and phylogenetic analysis of canine parvovirus-2 isolates in dogs revealed circulation of three subtypes in

Nigeria, *Virus Disease* https://doi.org/10.1007/s13337-018-0475-z

Francis, M.I., Kalang, J.J., Liba, J.W., Taluvwa, A.B., Tillo, I.M., Zakari, C. & Abdulrahman, R.B. (2019). Prevalence of canine parvoviral enteritis in Yola metropolitan region of Adamawa State, Nigeria. *Sokoto Journal of Veterinary Sciences*, 17(3) 24-29.

Houston, D.M., Ribble, C.S. & Head, L.L. (1996). Risk factors associated with parvovirus enteritis in dogs: 283 cases (1982-1991). *Journal of American Veterinary Medical Association*, 208:542-546.

Johnson, A. (2014). Canine Parvovirus Type 2 (CPV-2). In: Small Animal Pathology for Veterinary Technicians. Wiley-Blackwell. PP. 10–13.

Kalli, I., Leontides, L.S., Mylonakis, M.E., Adamama-moraitou, K. & Koutinas, A.F. (2010). Factors affecting the occurrence duration of hospitalization and final outcome in Canine parvovirus infection. *Research Veterinary Science.* 89 (2), PP 174-178.

Kingborg, D.J., Hustead, D.R., Curry-Galvin, E.A., Gum, B., Henry, S.C. & Bain, F.T. (2002). AVMA Council on biologic and therapeutic agents. Report on cat and dog vaccines. *Journal of the America Veterinary Medicine Association.* 221(10),1401-1407.

Ling, M., Norris, J.M., Kelman, M. & Ward, M.P. (2012). Risk factors for death from canine parvoviral-related disease in Australia. *Veterinary Microbiology*, 158(3–4):280–290.

Marcovich, J.E., Stucker, K.M., Carr, A.H., Harbison, C.E., Scarlett, J. M. & Parrish, C. R. (2012). Effects of canine parvovirus strain variations on diagnostic test results and clinical management of enteritis in dogs. *Journal American Veterinary Medical Association*. 241(1):66–72.

Mazzaferro, E.M. (2020). Update on Canine Parvoviral Enteritis. *Veterinary Clinic and Small Animal,* 50; 1307–1325.

Mylonakis, M., Kalli, I. & Rallis, T. (2016). Canine parvoviral enteritis; An update on the clinical diagnosis, treatment and prevention. *Journal of Veterinary Medicine, Research and Reports*, 7(1): 91-100.

Nandi, S. & Kumar. M. (2010). Canine Parvovirus: Current Perspective. *Indian Journal of Virology,* (21): 31-44.

Otto, C.M., Jackson, C.B., Rogell, E.J., Prior, R.B. & Ammons, W.S. (2001). Recombinant bactericidal/permeability-increasing protein (rBPI21) for treatment of parvovirus enteritis: a randomized, double-blinded, placebo-controlled trial. *Journal of Veterinary Internal Medicine*, 15(4):355–360.

Pinto, L.D, Streck A.F, Goncalves K.R, Souza C.K, Corbellini A.O, Corbellini L.G. & Canal, C. W. (2012). Typing of canine parvovirus strains circulating in Brazil between 2008 and 2010.*Virus Research*,165:29–33.

Shima, F.K., Omobowale, T.O., Adesina, R.D., Nottidge, H.O. & Fagbohun, O.A. (2020). Molecular characterisation of canine parvoviruses from clinical samples and vaccines in Nigeria. *Infections Genetics and Evolution*, 85: 104553.

Sykes, J.E. (2010). Immunodeficiencies caused by infectious diseases. *Veterinary Clinic North American Small Animal Practical,* 40, 409–23.

Truyen, U. (2006). Evolution of canine parvovirus: a need for new vaccines? *Veterinary Microbiology,* 117:9–13.

Ukwueze, C.S., Anene, B.M., Ezeokonkwo, R.C. & Nwosuh, C.I. (2018). Prevalence of canine parvovirus infection in South Eastern region, Nigeria. *Bangladesh Journal Veterinary Medicine*, 16 (2): 153–161.

Ukwueze, C.S., Nwosuh, C.I., Obishakin, E.F., Anene, B.M., Ezeokonkwo, R.C., Owoludun, O.A., Chima, N.C. & Luka, P.D. (2020). Genetic analysis and emergence of canine parvovirus type 2c in South Eastern Nigeria. *Iranian Journal of Veterinary Research*, 21(2): 141-145.