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First report of canine distemper viral antigen and its associated risk factors in wild animals in Jos, Northern Nigeria: A Survey

Kenneth Ikejiofor Ogbu[1*], Kingsley Uwakwe Ezema[2], Ijeoma Chekwube Chukwudi[3], Maimadu Audu Abdullahi[4], Hassan Ahmad Maikasua[4], Ahmed Dauda Magaji[1], Jibreel Abdullahi Sabo[5], Hamidu Sule[6], Nanmin Gagara Kromlep[1], Matthew Terzungwe Tion[7] and Ukamaka Uchenna Eze[3]

[1]Department of Animal Health Technology, Federal College of Animal Health and Production Technology Vom, Plateau State, Nigeria.
[2]Veterinary Teaching Hospital, University of Maiduguri, Borno State, Nigeria.
[3]Department of Veterinary Medicine, Faculty of Veterinary Medicine, University of Nigeria Nsukka, Enugu State, Nigeria.
[4]Department of Veterinary Laboratory Technology, Federal College of Animal Health and Production Technology Vom, Plateau State, Nigeria.
[5]Department of Environmental Health Management, Federal College of Animal Health and Production Technology Vom, Plateau State, Nigeria.
[6]Department of Animal Production Technology, Federal College of Animal Health and Production Technology Vom, Plateau State, Nigeria.
[7]College of Veterinary Medicine, Federal University of Agriculture Makurdi, Benue State, Nigeria.

[*]Corresponding author. Email: drken2016@gmail.com; ogbu.kenneth@fcahptvom.edu.ng; Tel: +2348030852357; ORCID: 0000-0003-0924-1604.

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ABSTRACT: Canine distemper virus (CDV) causes a contagious incurable often fatal, multi – systemic disease that affect the respiratory, gastro – intestinal and central nervous systems. Therefore, there is need to investigate some wild animals to ascertain their role as reservoir host which may contribute to the persistent occurrence of this disease in the domestic dog despite the availability of CDV vaccines. This prompted the research work to provide information about CDV in the study area. The aim was to determine the incidence of canine distemper virus antigen (CDV Ag) in some wild animals and non-human primates in Jos zoological museum and Plateau State Wildlife Park, Plateau State. A total of 42 fecal samples were collected from some wild animals. The samples were tested for CD antigen presence using SensPERT® Canine distemper Test Kit, VetAll Laboratories. Association between the incidence of infection and some factors such as sex, age, breed, family and location were determined using chi-square at 95% confidence interval. Total incidence recorded was 54.76% (23/42). There was significant difference in relation to location ($p<0.05$) but there was no significant difference in relation to sex, age, breeds and family. The result of the study established the presence of CDV infection in the study area among wild carnivores and non-human primates thus serving as the reservoir host for the virus. Regular check for Canine Distemper Antigen virus and other pathogens for early detection and maintenance of high standard hygiene practice are recommended. Integration of vaccination against preventable diseases such as CDV is also recommended in the management of wildlife.

Keywords: Antigen, canine distemper virus, Plateau State, survey, wild animals.

INTRODUCTION

Canine distemper viral disease is a contagious incurable often fatal, multi – systemic viral disease that affect the respiratory, gastro – intestinal and central nervous systems. CD virus occurs among domestic dogs and many

other carnivores, wild cats especially (tigers and leopards), including raccoons, skunks and foxes (Ogbu *et al*., 2023). CDV belong to genus morbillivirus within the paramyxoviridae family. In addition to causing disease in domestic dogs, CDV can cause high fatality in wild carnivores and can threaten to endangered carnivores' population (Funk and Gittleman*,* 2001; Mlanga *et al.,* 2018). The virus is quickly killed by disinfectants, sunlight and heat. However, the virus is very stable and can stay active in infected material for several weeks, provided the materials are not exposed to sunlight. At below zero temperature the virus can stay active for many months, but at temperature above 32°C it is rapidly inactivated (Ogbu *et al*., 2023).

Domestic dogs and many other carnivores, including the big cats, wild dogs, jackals and foxes are affected by CDV. The infection is more serve in puppies. Infected dogs shed the virus through body secretions. The main mode of transmission is through airborne. Normal animals get the infection by breathing the viral particles. Dogs in recovery may continue to shed the virus for several weeks after symptoms disappear and act as source for contamination. Domestic dogs are one of the most numerous carnivores in the world (Cottrell *et al*., 2013) and they are particularly abundant in urban areas of some developing regions where they can be excellent reservoir for pathogens since they usually live in large population. Those that are not vaccinated and are regularly allowed to roam freely, facilitate contact between infected and susceptible hosts (Ogbu *et al*.*,* 2023).

Key aspect for the control of CDV and for essentially minimizing its threat to wild life conservation should include the identification of infection and the contributing reservoirs, the mechanism modules by which infection are long sustained within reservoirs and the routes and sources of transmission from reservoirs to the target species of concern (George *et al*., 2022).

Despite the development of efficient and safe vaccine against canine distemper virus (CDV), several recent reports suggest both the re-emergence and increased activity of CDV worldwide (Figueroa *et al.*, 2023). CDV remains a major disease of dogs and wild carnivores and continued to stand a crucial danger for vaccinated and unvaccinated ones. Even though vaccines developed more than half a century earlier claim to provide sufficient protection in the susceptible wild carnivores and non-primates' population. However, there is paucity of information in the occurrence of CDV in wild animals in the study area. The aim of this study is to survey for the presence of canine distemper antigen in some wild animals in Plateau State wildlife park and Jos zoological museum and its associated risk factors.

MATERIALS AND METHODS

The study was conducted in Jos zoological museum and Plateau State wildlife Park Jos, Plateau State in Northern Nigeria. Jos zoological museum is located in Jos North local government area of Plateau State and covers a land area of 4.8 km². Jos North local government area is located between latitude 9°55N and longitude 8°54east. It covers a land mass of 291 km² (post offices-with map of LGA 2009).

Jos wildlife park is at Federal Low cost which is situated in Jos North local government area of Plateau State and it covers roughly 7.8 km² of savannah bush.

Sample size

The study was conducted on all the 42 wild carnivores (both aquatic and terrestrials) of different sexes, ages, breeds and species/families in Jos zoological museum and Plateau State wildlife park Jos, Plateau State which were available.

METHODOLOGY

Sample collection and analysis

Freshly voided fecal samples from wild carnivores and non-human primates at the Jos zoological museum and Plateau State wild life park were collected using disposable gloves and immediately transferred into the plain sample bottles. The sample was immediately move to Veterinary side laboratory, Federal College of Animal Health and Production Technology, National Veterinary research Institute Vom, Plateau State in a cold Chain for analysis.

The samples were tested for CD antigen presence using SensPERT® Canine distemper Test Kit, V*et al* Laboratories according to the manufacturer's intructions. Using swab stick, small amount of fecal sample was transferred into assay diluents and mixed properly using the diluents dropper and were allowed to settle to the bottom of the assay diluents tube. The test drive was removed from the foil pouch and placed on flat dry surface horizontally. Four (4) drops of the mixed sample was added into the sample holes of the test device using the dropper. As the test began to work a purple color band were seen moving across the result window in the centre of the test device.

NB: The kit has a control (C) and a test (T) band having purple colours. The results were interpreted after 5-10 minutes as follow;

Negative result: The presence of only one band within the result window indicated a negative result.

Positive result: The presence of two bands (C and T) within the result window, no matter which band that

Table 1. Occurrence of CDV in relation to sex.

Sex	No Examined	No. Positive	% Positive	P-value
Male	23	12	52.17%	0.711
Female	19	11	57.89%	
Total	42	23	54.76%	

Table 2. Incidence of CDV in relation to age.

Age	No. Examined	No. Positive	% Positive	P-value
<1-4yrs	12	7	58.33%	0.140
5-10yrs	15	9	60%	
11-15yrs	11	7	63.64%	
16 and above	4	-	-	
Total	42 (100%)	23	54.76%	

appears first indicated a positive result (V*et al* Laboratories, 2016).

Invalid result: Both the test and control lines do not appear or the test line only appears.

Data analysis

The data obtained were presented in tables and expressed in percentages. Associations between the factors i.e. sex, age, breed, family and location were analyzed using Chi-square method and P value <0.05 were considered statistically significant.

RESULTS

A total of 42 wild animals' samples were examined. These comprised of wild animals of different sex, age, breed, family and location from Wildlife Park and Jos Zoological Museum. A total of 54.76% (23 /42) wild animals were positive of canine distemper infection.

Occurrence of CDV based on sex

The occurrence of CDV antigen in wild carnivores and non-human primates based on sex revealed that 52.17% (12/23) males were positive for CDV while 57.89% (11/19) females recorded were positive for CDV. There is no significant difference between sex and infection rate at ($p<0.05$) as shown in Table 1.

Occurrence of CDV based on age

The animals were categorized into 5 age groups; Out of 12 animals of <1-4yrs sample, 58.33% (7/12) were positive of CDV. Out of 15 animals of age range 5-10 years, 60% (9/15) were positive of CDV. Among 11 animals of age strata 11-15 years, 63.64% (7/11) were positive of CDV as shown in Table 2. There was no significant difference ($p<0.05$) in the incidence of CDV infection in the study area among some wild animals of different age (Table 2).

Occurrence of CDV based on breeds

The animals were grouped into 10 based on breeds. Out of 4 spotted hyena (*Crocuta crocuta),* 75% (3/4) were positive with CDV. Among 4 lion (*Panthera leo),* 75% (3/4) were positive with CDV. Out of the 4 jackal (*Canis aureus)* sampled 50% (2/4) were positive with CDV. From *7* crocodile *(Crocodylus nitoticus)* that was sampled, 57.17% (4/7) were positive, 1(100%) caracal (caracal caracal) sampled was positive, *5* patas monkey *(Erythrocebus patas)* sampled, 60% (3/5) were positive, 5 Baboon (*Papio ursinus)* sampled, 80% (4/5) were positive, 4 Chimpanzee (*Pan troglodytes)* sampled, 25% (1/4) was positive, 5 Tantalus monkey (*Chlorocebus tantalus)* sampled, 40% (2/5) were positive with CDV as shown in Table 3. There was no significant difference ($p<0.05$) in the incidence of CDV infection in the study area among some wild animals of different breeds (Table 3).

Occurrence of CDV based on family

The animals were grouped into 6 families. Out of 8 Felidae, 50% (4/8) were positive with CDV, out of 4 Hyaenidae sample 75% (3/4) were positive with CDV. Among the 4 Canidae sample 50% (2/4) were positive with CDV.From 7 Crocodylidae sampled 57.14% (4/7) were positive, 17 Cercopithedae sampled 52.94 (9/17) were positive. From 4 Hominidae sampled 25% (1/4) was positive with CDV. There was no significant difference ($P<0.05$) in the incidence of CDV infection in relation to family (Table 4).

Table 3. Incidence of CDV in relation to breed.

Breed	No. Examined	No. Positive	% Positive	P-value
Crocuta crocuta	4	3	75%	0.480
Panthera Leo	5	3	60%	
Canis aureus	4	2	50%	
Crocodylus niloticus	7	4	57.14%	
Caracal caracal	1	1	100%	
Erythrocebus patas	5	3	60%	
Papio ursinus	5	4	80%	
Pan troglodytes	4	1	25%	
Cercopithecus mona	2	0	0.00%	
Chlorocebus tantalus	5	2	40%	
Total	42	23	54.76%	

Table 4. Occurrence of CDV in relation to animal family examined.

Family	No. Examined	Positive	% Positive	P-value
Felidae	8	4	50%	0.746
Hyaenidae	4	3	75%	
Canidae	4	2	50%	
Crocodylidae	7	4	57.14%	
Cercopithedae	17	9	52.94%	
Hominidae	4	1	25%	
Total	42	23	52.27%	

Table 5. Occurrence of CDV in relation to location.

Location	No. Examined	Positive	% Positive	P-value
Wildlife Park	15	12	80%	0.012
Jos Museum	27	11	40.74%	
Total	42	23	54.76%	

Occurrence of CDV based on location

A total of 42 wild animals were sampled from each of the study area with regard to location; of the 42 animals sampled, 15 were from Wildlife Park while 27 were from Jos zoological museum. Plateau State Wildlife Park and Jos Zoological Museum had an incidence rate of 80% (12/15) and 40.74% (11/27), respectively. There was strong statistical difference ($p<0.05$) in the incidence of CDV infection in the study area based on location (Table 5).

DISCUSSION

The present study brings to light the occurrence of CDV in wild animals in Jos zoological Museum and Plateau State Wildlife Park, Plateau State. Rapid CDV Ag test kit was used which is a chromatographic immunoassay for qualitative detection of Canine Distemper Virus (CDV) antigen in serum or plasma, conjunctiva fecal or urine. Fecal sample was used in this study to determine the incidence of Canine Distemper antigen in relation to sex, age, breed, family and location. Accurate identification and understanding of the impact of infectious diseases on the morbidity and mortality of wildlife population is a vital not only as a cautionary measure in the treatment of diseases but also for surveillance and risk assessments of disease outbreaks. Sufficient epidemiological information is rarely available to determine the level of threat a disease poses to the viability of many wildlife populations (Goller *et al*., 2010).

The study revealed the presence of CDV in 23 animals (54.76%) among the 42 animals sampled which is in

agreement with the study conducted by Taki and Bourquia (2023) who confirmed CDV in captive and free-ranging wild animals in Masai Mara, Kenya.

In this study, there is no significant difference between sex and infection rate. This report is in agreement with findings of Latha *et al.* (2007) which stated that all sexes of animals are susceptible to CDV infection.

Galietta *et al*. (2022) reported that the susceptibility of CDV depends on age of the animal where some wild animals are more susceptible to the occurrence of CDV infection. This was in contrast with this study as there is no statistical difference in regards to age on the incidence of CDV in some wildlife animals.

Ikeda *et al.* (2001) reported that all breed of some wild carnivores and non-human primates appeared to be affected by canine distemper virus infection. This is in agreement with this study as there is no significant difference between the breeds of wild animals sampled in the study areas. This may be as a result of improper management and lack of isolation of infected ones.

Base on this study, the incidence of CDV infection in the animal family showed that all species of wild animals are susceptible to CDV. This report is in agreement with the findings of Ikeda *et al.* (2001) and Budd *et al*. (1981) who reported the evidence of CDV infection in all families of terrestrial and aquatic carnivores.

The incidence of CDV infection in the study areas sampled shows that CDV infection is cosmopolitan; a total incidence of 54.76% was recorded. There was great statistical association between location and infection rates on the occurrence of CDV.

Conclusion

In conclusion, findings from this study showed the presence of CDV antigen in wild animals whose occurrence was not affected by sex as both male and female are susceptible to CDV infection. It affects both mammals and non-human primates of some wild carnivores. Also, it showed that CDV occurs in all areas and breeds.

Recommendations

Regular check with Canine Distemper Antigen Rapid test kit for early detection of canine distemper antigen and maintenance of high standard hygiene practice are recommended. In addition, awareness of the disease incidence should be made and more emphasis should be employed in regards to the importance of vaccination in wildlife to curb the problem of reservoir host. There is need for integration of routine vaccination of wildlife against prevailing diseases in the region of country of to prevent the outbreak.

REFERENCES

Cottrell, W. O., Keel, M. K., Brooks, J. W., Mead, D. G., & Phillips, J. E. (2013). First report of clinical disease associated with canine distemper virus infection in a wild black bear (*Ursus americanus*). *Journal of Wildlife Diseases*, *49*(4), 1024-1027.

Figueroa, R., Oliveira, R. D., & Sykes, J. M. (2023). A 40-year (1980–2019) retrospective review of morbidity and mortality of fennec foxes (Vulpes zerda) at the Bronx and Prospect Park Zoos. *Journal of Zoo and Wildlife Medicine*, 54(2), 252-261.

Funk, S. M., & Gittleman, J. L. (2001) The role of disease in carnivores ecology and conservation ". Cambridge university press, Cambridge, UK. Pp. 441-466

Galietta, V., Eleni, C., Raso, C., Cocumelli, C., & Friedrich, K. G. (2022). Systemic infection by *Angiostrongylus vasorum* in a fennec (*Vulpes zerda*) in an Italian zoological garden. *Pathogens*, *11*(9), 1024.

George, A. M., Wille, M., Wang, J., Anderson, K., Cohen, S., Moselen, J., Lee, L. Y. Y., Suen, W. W., Bingham, J., & Barr, I. G. (2022). A novel and highly divergent Canine Distemper Virus lineage causing distemper in ferrets in Australia. *Virology*, *576*, 117-126.

Goller, K. V., Fyumagwa, R. D., Nikolin, V., East, M. L., Kilewo, M., Speck, S., Müller, T., Matzke, M., & Wibbelt, G. (2010). Fatal canine distemper infection in a pack of African wild dogs in the Serengeti ecosystem, Tanzania. *Veterinary microbiology*, *146*(3-4), 245-252.

Ikeda, Y., Nakamura, K., Miyazawa, T., Chen, M. C., Kuo, T. F., Lin, J. A., Mikami, T., Kai, C., & Takahashi, E. (2001). Seroprevalence of canine distemper virus in cats. *Clinical Diagnostic Laboratory Immunology*, *8*(3), 641-644.

Latha, D., Srinivasan, S. R., Thirunavukkarasu, P. S., Gunaselan, L., Ramadass, P., & Narayanan, R. B. (2007). Assessment of canine distemper virus infection in vaccinated and unvaccinated dogs. *India Journal of b\Biotechnology, 6*, 35-40.

Mlanga, S. S., Ibu, J., & Ezeokoli, C. D. (2018). Epidemiology of canine distemper in Makurdi, Nigeria. *Nigerian Veterinary Journal*, *39*(1), 45-50.

Ogbu, K. I., Chukwudi, I. J., Ezema, K. U., Momoh-Abdullateef, H., Sabo, J. A., Malgwi, R. I., Okonkwo, R.A., Madubueze, J., & Tion, M. T. (2023). Serological and antigenic detection of canine distemper virus (CDV) among Nigerian local hunting dogs at dog markets of plateau state, north central Nigeria. *Journal of Advances in Microbiology Research*, *4*(1), 108-112.

Taki, Y., & Bourquia, M. (2023). Gastrointestinal and respiratory parasites in captive mammals at Rabat zoo, with the first record of Capillaria spp. in the Fennec fox (*Vulpes zerda*). *Veterinaria Italiana*, *59*(3), 207-217.