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Prevalence of Canine Distemper Virus in Dogs in Northern Plateau State, Nigeria

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Abstract: This study investigated the prevalence of Canine Distemper (CD) Antigen in dogs in three major clinics in Northern part of Plateau State. A total of 150 blood samples were and sera were used to test for CD Antigen using Rapid CDV Ag Test Kit which is a chromatographic immunoassay for qualitative detection of Canine Distemper Virus (CDV) antigen. Associations between factors were analyzed using Chi square at 95% confidence interval. A prevalence of 45.33% was recorded. There was significant difference in relation to age, breed and vaccination status ($P<0.05$) but no significant difference in relation to sex and location. The result of the study established the presence of CDV infection in the study area incriminating age and breed as the risk factors. Therefore, there is need for establishment of adequate control measures especially through vaccinations and sero-monitoring of the vaccinated animals in the area using rapid CDV test kits.

Keywords: Canine distermper virus, Dogs, Serum, Prevalence, Plateau state

INTRODUCTION

Canine distemper virus (CDV) is a single-stranded, non-segmented, negative-sense RNA virus belonging to the genus morbillivirus. Canine distemper was first described in Spain in 1791 and the virus was first isolated by Carre in 1905 [1]. CDV is a highly contagious viral infection of different carnivores that belong to numerous animal families, such as *Canidae, Mustelidae, Procyonidae, Felidae, Phocidae, Viverridae, Ursidae* and many others [2, 3]. It can cause a devastating disease in dogs and other carnivores [3]. Canine distemper, a potentially fatal viral disease, multi-systemic and highly contagious disease caused by canine distemper virus (CDV), was recognized as one of the leading cause of death in dogs [4]. CDV was also recognized as a wide host range enzootic disease which has been reported in most parts of the world, Nigeria inclusive [4].

It is transmitted by aerosols or contact with oral, respiratory, and ocular fluids and exudates containing the virus but nonetheless entirely all secretions and discharges could still harbor the virus [4-6]. Interspecies transmission frequently occurs and in recent years distemper has been observed in species that were previously not considered to be susceptible.

In affected dogs, Canine distemper virus causes primary systemic and central nervous system (CNS) disease [7] and it is also known to cause a large variety of clinical signs, depending mainly upon the age and immune status of the host as well as the virus strain. Infection can lead to abortion, clinical or subclinical disease courses [8, 9]. Similar to other paramyxoviruses, such as the closely related measles virus (MV), CDV infection causes lymphoid depletion and enduring immunosuppression, which favor secondary infections. Clinical signs in affected dogs include catarrhal respiratory and gastrointestinal disorders, alterations of the skin, and central nervous system (CNS) disease [8]. Diagnosis of canine distemper includes haematology, immunocytochemistry, virus isolation, polymerase chain reaction (PCR), cerebrospinal fluid (CSF) analysis, serology, ELISA Tests for CDV specific IgM.

In Nigeria, CDV vaccines are polyvalent vaccines commercially available, sold and given in combination with other vaccines such as leptospirosis, infectious canine hepatitis, parainfluenza and parvovirus vaccines (DHLP+P combined vaccine) [10]. Despite the development of efficient and safe vaccines against canine distemper virus (CDV), several recent reports suggest both the re-emergence and increased activity of CDV worldwide [11]. CDV remains a major

disease of dogs and continued to stance a crucial danger for vaccinated and unvaccinated dogs, mostly dogs in exotic shelters [7]. Even though vaccines developed more than half a century earlier seems to provide sufficient protection in the susceptible canine population, the number of infected animals is still high [12]. However, early detection of Canine distemper virus antigen will help reduce the number of infected dogs. Therefore, this study was aimed at determining the prevalence of Canine Distemper antigen in dogs presented in veterinary clinics of the study area so as to curb the spread of the virus through early detection of the virus in dogs.

METHODOLOGY

The study was conducted on 150 dogs of different breed, sex and age presented in major veterinary clinics in Plateau North Senatorial Zone of Plateau State. The record of vaccination if any was obtained from the dog owners and verified from clinic records. All dogs with unverifiable vaccination record were considered as unvaccinated. The dogs were restrained properly and blood samples collected from the cephalic vein of each dog into plain sample bottles. The sites of injection were prepared aseptically with swabs soaked in methylated spirit. Blood samples collected were aseptically transferred into sterile plastic universal anticoagulant-free sample bottles. The samples were kept under room temperature of 20-25^{0}c on slanting position and were left for 4-5 hours for proper clotting. Sera from the blood samples were decanted into plain sample bottles. The samples were tested using Rapid CDV Ag Test Kit which is a chromatographic immunoassay for qualitative detection of Canine Distemper Virus (CDV) antigen in the sera.

Procedure

- 2-3 drops of serum was added into the specimen tube containing 300µl of assay diluents using the dropper and was mixed properly.
- The test device was removed from the foil pouch and was placed on flat dry surface
- Four (4) drops of the mixed sample was added into the sample hole of the test device using the dropper, drop by drop and solely
- As the test began to work, a purple colour bands 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 both having purple colour.

Fig-1: Rapid CDV Ag Test Kit

The results were interpreted after 5-10 minutes as follows;

1) **Negative result**
   The presence of only one band ("C") within the result window indicated a negative result.
2) **Inconclusive result**
   The presence of only one band ("T") within the result window indicated a wrong result.
3) **Positive result**
   The presence of two bands ("T" and "C") within the result window, no matter which band that appears first indicated a positive result

Statistical Analysis

The data obtained were expressed in percentages and presented in tables. Associations between the factors were analyzed using Chi Square method and p values < 0.05 were considered statistically significant.

RESULTS

Summary of Results

A total of 150 dogs were examined. These comprised dogs of different sex, age, breed, vaccination status and location from three (3) clinics in Northern part of Plateau State namely Plateau State Veterinary Clinic, Jos, Barkin Ladi and Riyom Veterinary Clinics. A total of 68 (45.33%) dogs were positive while 82 (54.7%) were negative.

The prevalence of CDV antigen in dogs based on sex showed that 32 males out of the 62 males

sampled were positive with CDV antigen with a prevalence rate of 21.33% while 36 females out of 88 females sampled were positive for CDV antigen with a prevalence rate of 24.00% as shown in table 1. There was no significant difference (χ^2=1.68, $\chi^2_{0.05}$ =3.84) in the prevalence of CDV infection in the study area among dogs of different sex (Table 1).

Based on age, a total of 58 dogs were puppies while 92 were adults from the 150 dogs sampled. Among the young ones, the prevalence of CDV antigen was 38 (25.33%) out of the 58 puppies sampled while 30 out of the 92 adults sampled tested positive to CDV antigen with a prevalence rate of 20%. There was a statistically significant association (χ^2=15.55, $\chi^2_{0.05}$=3.84) between the puppies and adult dogs (Table 2).

Among the dogs sampled, 66 dogs were exotic breeds and 84 were local breeds. The prevalence of CDV antigen in dogs based on breed showed that 20 dogs out of the 66 exotic dogs sampled tested positive to CDV antigen with a prevalence rate of 13.33% while 48 local dogs out of the 84 local breeds sampled tested positive with a prevalence rate of 32%. There was statistical difference (χ^2=10.7, $\chi^2_{0.05}$=3.84) in the prevalence of CDV infection in the study area between the exotic and local breed (Table 3).

Based on location, a total of 50 dogs were sampled from each of the three centers: Plateau State Veterinary clinic, Barkin Ladi Veterinary clinic and Riyom Veterinary Clinic had prevalence rate of 16(10.67%), 24(16%) and 28(18.66%) respectively. There was no statistical difference in the prevalence based on location (χ^2=1.48, $\chi^2_{0.05}$=5.99) (Table 4).

Based on vaccination status, a total of 46 dogs out of the 150 dogs sampled were vaccinated while 104 were not vaccinated. 14 out of the 46 vaccinated tested positive to CDV antigen with a prevalence of 9.33% while 54 out of 106 dogs not vaccinated were positive for CDV antigen with a prevalence of 36% (Table 4). There was significant difference (χ^2=5.94, $\chi^2_{0.05}$=3.84) between vaccination status and CDV antigen prevalence.

Table 1: Prevalence of CDV in relation to sex distribution of dogs sampled

Sex	Positive	Negative	Total
Male	32(21.33%)	30(20.00%)	62(41.33%)
Female	36(24.00%)	52(34.67%)	88(58.67%)
Total	**68(45.33%)**	**82(54.67%)**	**150(100%)**

χ^2=1.68; df=1; P=3.84

Table 2: Prevalence of CDV in relation to age distribution of dogs sampled

Age	Positive	Negative	Total
Puppies<6months	38(25.33%)	20(13.33%)	58(38.66%)
Adults>6months	30(20%)	62(41.33%)	92(61.33%)
Total	**68(45.3%)**	**82(54.7%)**	**150(100%)**

χ^2=15.55; df=1; P=3.84

Table 3: Prevalence of CDV in between local and exotic breeds

Breed	Positive	Negative	Total
Exotic	20(13.3%)	46(30.7%)	66(44%)
Local	48(32%)	36(24%)	84(56%)
Total	**68(45.3%)**	**82(54.7%)**	**150(100%)**

χ^2=10.74; df=1; P=3.84

Table 4: Prevalence of CDV in relation to location of sample collection

Location	Positive	Negative	Total
Vet Hospital Jos	16(10.7%)	34(22.7%)	50(33.4%)
Barkin Ladi Vet	28(18.7%)	22(14.7%)	50(33.4%)
Riyom Vet	24(16%)	26(17.2%)	50(33.2%)
Total	**68(45.4%)**	**119(54.6%)**	**150(100%)**

χ^2=2.3429; df=2; P=5.99

Table 5: Prevalence of canine distemper antigen based on vaccination status

Vaccination Status	Positive (%)	Negative (%)	Total (%)
Vaccinated	14 (30.4)	32(69.6)	46 (30.7)
Non- Vaccinated	54 (51.9)	50 (48.1)	104 (69.3)
Total	**68 (45.3)**	**82 (54.7)**	**150 (100)**

χ^2=5.94; df=1; P=3.84

DISCUSSION

The study revealed that the prevalence did not differ based on sex of the sampled dogs (Table 1). This is in agreement with the findings of Latha *et al*., [13] who stated that sex does not affect the prevalence of dogs to canine distemper in dogs. This shows that CDV does not depend on the sex of dogs for infection to be established.

Based on the age, the prevalence of the sampled dogs was highly significant in puppies than adults. This was in agreement with Jozwik and Frymus, [14] who reported that susceptibility of CDV depend on age of the animal with the puppies being more susceptible than the adults. This was also in contrast with the reports of Latha *et al*., [13] which suggested that adult dogs (1-5 years old) are more susceptible. This may be due to incompetent/immature immune system of puppies that predispose them to some infectious disease agents such as CDV.

The prevalence among breeds differed significantly as the local breed showed higher prevalence than the exotic breed. This is in support of Greene and Appel, [7] who recorded that the susceptibility of dogs to CDV is dependent on the breed. This can be attributed to the different management practice adopted in the study area by the owners as local dogs are allowed to stray about without adequate vaccinations unlike the exotic breeds that well confined and adequately vaccinated.

The prevalence of CDV did not differ significantly when compared between the locations which were in agreement with the reports of Latha *et al*., [13]. This may be due to cosmopolitan distribution of CDV worldwide.

Based on vaccination status, the prevalence of CDV was significantly higher among the unvaccinated dogs than the vaccinated. This was in agreement with Latha *et al*., [13] who reported higher infection in unvaccinated dogs than in vaccinated dogs.

However, CDV infection can be found even in vaccinated dogs. This implies that "vaccine failure" can occur in vaccinated dogs which agree with the study as few of the vaccinated dogs were positive, this could be due to failure of the immune system to respond than a problem with the vaccine itself. It was also in agreement with Truyen, who reported cases of CDV infection after vaccination which poses a challenge to veterinarians and vaccine producers.

CONCLUSION AND RECOMMENDATIONS

In conclusion, findings from this showed that the prevalence of CDV is not affected by sex as both male and females are susceptible to CDV infection. It affects mostly puppies and exotic breeds. Also, it showed that CDV occurs in all areas and breeds. However, adult dogs and vaccinated dogs are less susceptible to the virus. Adequate vaccination of dogs, regular check with Canine Distemper Antigen Rapid Test Kit for the early detection of canine distemper antigen and maintenance of high standard hygiene practice are recommended. All these will help. In addition, awareness of the disease prevalence should be made and more emphasis should be made with regards to the importance of vaccination in more susceptible dogs (puppies) and annual vaccination in less susceptible ones (adults).

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