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Prevalence of Canine Parvovirus in Jos North and South Local Government Areas of Plateau State

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

The research was conducted to determine the prevalence of canine parvovirus in dogs in Jos-North and South Local Government Areas of Plateau State. The prevalence in relation to sex, location, vaccination status, age and breed were evaluated. The samples for this research work were collected from veterinary clinics and major dog breeders in the study areas and were analyzed in the college laboratory using immunochromatographic assay technique. A total number of 70 dogs were examined out of which 40 samples were from veterinary clinics (10 samples from each Vet clinic) and the remaining 30 were from major dog breeders. A total of 12(17.14%) were positive for the infection while 58(82.86%) were negative. Based on sex, 5(14.71%) were positive females while 7(19.44%) were positive males. Based on the location, 5(14.29%) positive samples were from Jos-South while 7(20%) were from Jos-North. Based on vaccination status, 2(5.13%) and 10(32.26%) were positive among the vaccinated and unvaccinated dogs respectively. A total of 12(28.56%) samples were positive among the puppies (1-6 months old) while none were positive among the adults. Based on the breed, 11(21.15%) and 1(5.56%) were positive exotic and local breed respectively. The study showed that canine parvovirus occurs in all areas and breeds and it affects mostly puppies, exotic breeds and non-vaccinated dogs. However adult dogs and vaccinated dogs are less susceptible to the virus.

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1. INTRODUCTION

Canine parvovirus (CPV) is the smallest virus of vertebrates belonging to the virus family *parvoviridae* and group *papovavirus*. It is highly stable, resistant to chemicals like ether, physical factors like low p^H and are not seriously affected by heat even at 60℃ for one hour [1]. With history, parvovirus has long been the most dreaded virus causing parvoviral infection in canine species (dogs), feline species (cats), avian (birds) and even humans. The infection in dogs is more pronounced in puppies, producing foul smelling brownish feces. Similar viruses produce different condition in cats, chicken and humans [1,2].

Canine parvovirus spreads to susceptible dogs by fecal or oral route. The transmission of the virus causing parvovirus infection is basically by direct contact with infected dogs or indirectly by contact with fecal contaminated fomites (inhalation). The ability of the virus to invade the epithelial cells of the intestinal wall of the animal, sloughing of the mucosa cell of the intestine, especially the large intestine are of great importance, since little or nothing is done to suppress the organism [3].

According to Ettinger et al. [4], dogs that develop the disease show signs of illness within 3-7days. The signs may include lethargy, vomiting, fever, and diarrhea (usually bloody); generally, the first sign of canine parvovirus (CPV) is lethargy. Secondary signs are loss of appetite, vomiting and diarrhea resulting in dehydration that upsets the electrolyte balance and this may affect the dog critically. Secondary bacterial infections occur as a result of weakened immune system because the normal intestinal lining is also compromised, blood and protein leak into the intestine leading to anemia and loss of protein and endotoxins escaping into the blood stream, causing endotoxaemia. Dogs have a distinctive odour in the later stages of the infection. The white blood cell level falls, further weakening the dog. Any or all of these factors can lead to shock and dead.

Prevention is the only way to ensure that a puppy or dog remains healthy as the disease is extremely virulent and contagious. Appropriate vaccination remains the key preventive measure [4].

Canine parvovirus (CPV) infection has been recently recognized as a growing worldwide conservation threat for many carnivores, including dogs, it is currently the most common infection of dogs [5].

Canine parvovirus is an important pathogen of dogs and is responsible for serious occurrences of morbidity and mortality despite the availability of safe and effective vaccines [6]. It is a highly contagious viral disease that can produce life threatening illness in puppies and adult dogs. It can be transmitted by any person, animal or object that comes in contact with an infected dog's feces. The enteric form of the disease is a serious problem in breeding kennels especially where vaccination is not widely practiced [7]. There is paucity of information about the prevalence of canine parvovirus in the area of study. Therefore the aim of this work is to determine the presence of parvoviral antigen in dogs and to evaluate the prevalence of parvoviral antigen in relation to age, sex, breed, vaccination status and location.

1.1 Sample Collection

Faecal samples were collected from different parts of Jos North and South Local Government Areas. The samples were collected by the use of disposable gloves per rectum. A total of seventy samples were collected from the areas (35 samples each).

1.2 Faecal Analysis

Immunochromatography assay. It was carried out with a commercial rapid CPV Ag test kit (Manufactured by Ubio technology systems. *Biotechnology incubation centre, Kinfra Hi-tech park, Kalamassery, Cochin, India.*), following the manufacturer's instructions. This kit is a chromatographic immunoassay for the qualitativ detection of *parvovirus* antigen in canine feces. It can detect the pathogenic CPV subtypes CPV2a or CPV2b.

A small amount of faecal sample was transferred into the assay diluents with the use of a spatula. This was centrifuged for 10 minutes under 3000 rpm using a centrifuge machine. The debris was discarded while the supernatant was used. The test card was taken out of the aluminium foil pouch and placed on a horizontal surface, and then 3 drops of the supernatant were added to the sample hole by the use of a pipette, the result was then interpreted within 5-10 minutes [8]. The

test was interpreted as described by Esfandiari and Klingeborn [9].

1.3 Data Analysis

The data obtained were analyzed using chi-square method and p values < 0.05 were considered statistically significant. The results were presented in tables and expressed in simple percentages.

2. RESULTS

A total number of 70 dogs were examined. These comprised dogs of different sex, age, breed, vaccination status and location. A total of four veterinary clinics (two from each local government) were visited were 40 samples were screened for parvoviral infection (10 samples from each veterinary clinic). The remaining (30 samples) were from major dog breeders. A total of 12 (17.14%) were positive for infection while 58 (82.86%) were negative.

Among the dogs screened, 36 dogs were males while 34 dogs were females. The prevalence of parvovirus among the males was 7(19.44%) while that of female was 5(14.71%). There was no significant difference (P>0.05) in the prevalence of parvovirus in the study area among dogs of different sex (Table 1).

Table 1. Prevalence of CPV in relation to sex distribution

Sex	Positive	Negative	Total
Male	7 (19.44%)	29 (80.56%)	36 (51.43%)
Female	5 (14.71%)	29 (85.29%)	34 (48.56%)
Total	**12 (17.14%)**	**58 (82.86%)**	**70 (100%)**

Calculated chi square =0.26
Degree of freedom (df) (2-1) (2-1) =1
Critical (table) chi square:
Probability of 0.05= 3.841
(The critical chi square is the same for all where df = 1);
Sample size = 70

A total of 35 dogs were screened from each Local Government Area of the study area (Jos North and South Local Government Areas) from two veterinary clinics and dog breeders. In Jos South, 5(14.29%) dogs were positive while 30(85.71%) were negative while in Jos North, 7(20%) dogs were positive while 28(80%) were negative. There was no significant difference (P>0.05) in the prevalence of parvovirus in the study area among dogs from different locations (Table 2).

Among the four veterinary clinics and dog breeders visited, 31(44.29%) did not vaccinate their dogs and had 10(32.26%) positive and 21(67.74%) negative. A total of 39(55.71%) did vaccinate their dogs and had 2(5.13%) positive while 37(94.87%) were negative. The prevalence of canine parvovirus among the dogs screened differed significantly (P<0.05) between the vaccinated and unvaccinated dogs (Table 3).

The dogs were classified into two age groups - puppies (1-6 months) and adults (above 6 months). A total of 42 dogs were young ones while 28 dogs were adults. Among the young ones, the prevalence of parvovirus was 12 (28.57%) while all the adults (28) were negative (100%). The prevalence of canine parvovirus among the dogs screened differed significantly (P<0.05) between puppies and adult dogs (Table 4).

Among the dogs screened, 52 dogs were exotic breed while 18 dogs were local breed. The prevalence of canine parvovirus among the exotic breed was 11(21.15%) while that of local breed was 1(5.56%). There was no significant difference (P>0.05) in the prevalence of parvovirus in the study area among dogs of different sex (Table 1). There was significant difference (P>0.05) in the prevalence of canine parvovirus in the study area between the exotic and local breed (Table 5).

Table 2. Prevalence of CPV in relation to location of sample collection

Location	Positive	Negative	Total
Jos-South	5 (14.29%)	30 (85.71%)	35 (50%)
Jos-North	7 (20%)	28 (80%)	35 (50%)
Total	**12 (17.14%)**	**58 (82.86%)**	**70 (100%)**

Calculated chi square = 0.40; Sample size = 70

Table 3. Prevalence of CPV in relation to vaccination status of dogs sampled

Vaccination status	Positive	Negative	Total
Vaccinated	2 (5.13%)	37 (94.87%)	39 (55.71%)
Not vaccinated	10 (32.26%)	21 (67.74%)	31 (44.29%)
Total	**12 (17.14%)**	**58 (82.86%)**	**70 (100%)**

Calculated chi square = 8.95; Sample size = 70

Table 4. Prevalence of CPV in relation to age distribution of dogs sampled

Age	Positive	Negative	Total
Puppies (1-6 months)	12 (28.57%)	30 (71.43%)	42 (60%)
Adults (6 months and above	_	28 (100%)	28 (40%)
Total	**12 (17.14%)**	**58 (82.86%)**	**70 (100%)**

Calculated chi square = 4.86; Sample size = 70

Table 5. Prevalence of CPV between local and exotic breeds

Breed	Positive	Negative	Total
Exotic breed	11 (21.15%)	41 (58.57%)	52 (74.29%)
Local breed	1 (5.56%)	17 (94.44%)	18 (25.71%)
Total	**12 (17.14%)**	**58 (82.86%)**	**70 (100%)**

Calculated chi square = 4.29; Degree of freedom (df) (2-1) (2-1) =1; Sample size = 70

3. DISCUSSION

Prevalence of canine parvovirus infection was determined in Jos-North and Jos-South Local Government Areas of Plateau state. In the study areas, it was discovered that sex had no influence on the prevalence of parvovirus in dogs (Table 1). This agrees with Castro et al. [10] and Gombac et al. [11] who stated that all sexes of dogs have been found to be susceptible to parvovirus infection. It disagrees with Gombac et al. [12] on a study in Slovenia which showed that 83.3% of dogs that died due to canine parvovirus infection were males and 16.7% were females, the difference being statistically significant.

Location did not influence the prevalence of canine parvovirus in the study area. This is accordance with the report of Truyen, [13] who stated that distribution of canine parvovirus infection is worldwide (Table 2).

The prevalence of canine parvovirus was more in the unvaccinated dogs than the vaccinated dogs. This is in agreement with the reports of Wayne and Carter [3], Ernest [14] and Dogonyaro [1] who stated that the most effective method of control is vaccination. Kingborg et al. [15] also stated that some vaccinated dogs still contract canine parvovirus although it is more likely a failure of the immune system to respond than a problem with the vaccine itself. This implies that "vaccine failure" can occur in vaccinated dogs which agree with the study as few of the vaccinated dogs were positive. It was also in agreement with Truyen, [13] who reported cases of CPV infection after vaccination which poses a challenge to veterinarians and vaccine producers. There was concern that the vaccines used currently to prevent CPV infection in dogs may fail to effectively protect puppies against the canine parvovirus infection. Various studies have however, demonstrated that the CPV vaccine are still effective in inducing protection against CPV infection [16-19]. The efficacy of the vaccine was reflected in the study as more unvaccinated dogs were positive while few of vaccinated dogs were positive (Table 3).

Ettinger et al. [4] reported that the susceptibility of CPV depend on the age of the animal where the puppies are more susceptible than the adult. This was in agreement to the study which revealed 28.57% of puppies positive while 100% negative was recorded in adult dogs (Table 4). Furthermore, comparison between the age groups due to canine parvovirus infection showed statistical significance in Slovenia studies [20]. This may because puppies' antibodies were too low to provide protection against the disease [15]. It has been reported that exotic breed of dogs appear to be under great risk of developing parvoviral enteritis [21,22]. This also agreed with the study as exotic breeds had higher prevalence than the local breed and the difference was statistically significant (Table 5).

4. CONCLUSION AND RECOMMENDATIONS

Findings from this study showed that canine parvovirus occurs in all areas and breeds. It affects mostly puppies, exotic breeds and non-vaccinated dogs. However adult dogs and vaccinated dogs are less susceptible to the virus. Adequate vaccination of dogs, regular check especially with canine parvovirus antigen rapid test kit for the early detection of canine parvovirus antigen and maintenance of high standard hygiene practice are recommended. All these will help to improve the health of the dog by preventing the outbreak of canine parvoviral infection.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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