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Chicken anaemia virus antibody status of Laughing Doves, Speckled Pigeons, Cattle Egrets, Village Weavers and African Silver Bills in Zaria, Nigeria

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ABSTRACT

Aim: The aim of this study was to determine chicken anaemia virus (CAV) antibody status of some free-living wild birds in Zaria, Nigeria.

Method and Materials: One hundred and fifty free-living wild birds, comprising 30 birds each of Laughing doves, Speckled pigeons, Cattle egrets, Village weavers and African silver bills were sampled over a period of 9 months. Blood samples were collected from each bird and harvested sera were tested for CAV antibodies using enzyme linked immunosorbent assay.

Results: It was indicated CAV seroprevalences of 6.67 % in Speckled pigeon (95% CI, 6.35 – 6.99), 3.33 % in Cattle egret (95% CI, 3.10 – 3.56 %), 16.67 % in Village weaver (95% CI, 16.19 – 17.15 %) and 3.3 % in African silver bill (95% CI, 3.10 – 3.56 %). These free-living wild birds had CAV seroprevalence of 6.0 % (95 CI, 5.86 – 6.14 %) in Zaria.

Conclusion: It was indicative of previous natural exposure to CAV and they could be involved in the possible spread of the virus. Hence, measures to prevent direct and indirect interactions of chickens with these wild birds should be implemented in commercial poultry.

Keywords: Antibody, chicken anaemia virus, natural exposure, sera, wild birds.

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Introduction

Chickenanaemia (CA) is a viral infection of poultry caused by CA virus (CAV) (Yuasa et al. 1979).The infection is characterized by aplastic anaemia, subcutaneous and intramuscular haemorrhages, immunosuppresionand high mortality in chickens aged 2-4 weeks-old (Taniguchi et al. 1983; Goryo et al. 1989; Rimondi et al. 2014). Chicken anaemia virus is a single stranded DNA virus with icosahedral symmetry belonging to the family Anelloviridae and genus gyrovirus(Rosarioet al. 2017). Previously, chickens were believed to be the only natural host of CAV, the infection has been reported in Japanese quails, ducks and turkeys (Farkas et al. 1998; Gholami-Ahangaran et al. 2013; Shettima et al. 2017).

The virus was first isolated in Japan in 1979 using specific-pathogen free (SPF) chicks inoculated with contaminated Marek's disease vaccines (Yuasa et al. 1979). The disease has been reported in Nigeria (Emikpe et al. 2005; Oluwayelu and Todd, 2008), northern Vietnam (Van Dong et al. 2019), Taiwan (Ou et al. 2018), Egypt (Hussein et al. 2002), South Africa (Witch and Maharaj, 1993) and other major chicken producing countries of the world. The mode of transmission of CAV can be through horizontal and vertical means (Schat 2003).

Chicken anaemia is a common global disease of chickens due to the detection and isolation of CAV from poultry flocks where it causes immunosuppression and economic losses (Bhatt et al. 2011; Shettima et al., 2017; Orakpoghenor, 2019; Jordan et al., 2019). The immunosuppression due to CAV may lead to vaccination failures and exacerbation of secondary infections such as avian influenza (H9N2) and infectious bronchitis (Haridy et al. 2009; Oluwayelu, 2010; Erfan et al. 2019). Economic losses result from poor growth, vaccination failures, high mortality and cost of antibiotics against secondary bacterial infections

(McNulty, 1991; Schat, 2003; Oluwayelu, 2010).

There is no information on the CAV antibody status of wild birds in Nigeria. Therefore, the aim of this study was to detect antibodies against CAV in free-living wild birds in Zaria, Nigeria.

Materials and Methods

Ethics Statement

Handling of animals and blood samples collection, conducted in this study, was approved by the Ahmadu Bello University Committee on Animal Use and Care (ABUCAUC), Ahmadu Bello University, Zaria, Nigeria.

Sampling of Birds

Based on convenience sampling method, a total of 150 birds comprising 30 each of Laughing doves (*Spilolepiasenegalensis*), Speckled pigeons (*Columba guinea*), Cattle egrets (*Bubulcus ibis*), Village weavers (*Ploceuscucullatus*) and African silver bill (*Euodicecantans*) were sampled alive over a period of 9 months (March – December, 2017). The study was designed to sample until 30 of each species were caught. These species of birds were considered based on their frequent visits to poultry houses and previous occurrence of CA in the region. The birds were captured alive and unhurt using wooden traps kept at strategic positions around the poultry houses located at different locations within the environ. The traps involved a constructed cage to avoid injury to the birds but only restrict their movement.

Blood Sample Collection

Blood sample (0.5-1 ml) was collected from each bird via the wing vein using sterile hypodemic syringes and 23G needles. Sera were harvested into labeled sterile plastic containers and stored at -20^{0}C until used CAV antibody detection. After blood sample collection, each bird was marked and released to avoid repeated sampling of the same bird.

Enzyme linked immunosorbent assay for detection of CAV antibody

The test sera were subjected toindirect enzyme linked immunosorbent assay (ELISA) using chicken anaemia virus antibody test kit (IDEXX CAV) obtained from IDEXX Laboratories Inc., Westbrook, Maine 04092 USA, by following the manufacturers' instructions. The absorbance values were measured and recorded at 650 nm wavelength using ELISA microtitre plate reader. The relative level of antibody to CAV in the sample was determined by calculating the sample to negative (S/N) ratio. Sera with S/N ratios greater than 0.60 were interpreted as negative. Sample to negative ratios less than or equal to 0.60 were interpreted as positive and indicated vaccination or field exposure to CAV according to the Manufacturers' Technical Guide.

Data Analyses

The ELISA data were presented as percentages in a Table. The prevalence of CAV antibody was calculated for each bird species using the formula outlined by Bennette et al. (1991):

Prevalence for each species (%) =

$$\frac{\text{number of serum positive for each species}}{\text{total number of serum examined for the species}} \times 100$$

The 95% confidence interval (CI) for each species was calculated using the formula by Mahajan (1997):

$CI = p \pm z \times \sqrt{p(1-p)/n}$

where p = calculated prevalence,

z = area to the right of a z-score and

n = number of samples

Results

The result of this study shows CAV seroprevalence of 6.67 % (2/30) in Speckled pigeons, 3.33 % (1/30) in Cattle egrets, 16.67 % (5/30) in Village weavers and 3.33 % (1/30) in African silver billsin Zaria, North West Nigeria (Table 1).

Table 1: Prevalence of chicken anaemia virus antibodies in some free-living wild birds in Zaria, Nigeria

Species of birds	Number of samples tested	Number of samples positive	Prevalence	95 % CI
Laughing doves	30	0	0.00	0.00 – 0.00
Speckled pigeons	30	2	6.67	6.35 – 6.99
Cattle egrets	30	1	3.33	3.10 – 3.56
Village weavers	30	5	16.67	16.19 – 17.15
African silver bills	30	1	3.33	3.10 – 3.56
Total	150	9	6.00	5.86 – 6.14

Discussion

The present study was undertaken to detect CAV antibodies in some free-living wild birds in Zaria, Nigeria. In this region, vaccination of chickens against CA is not a common practice. Shettima et al. (2017) reported seroprevalence of CAV antibodies in turkeys (23.6%), ducks (13.7%) and geese (22.7%) at Maiduguri, North Eastern Nigeria. Adedeji et al. (2016) reported a concurrent and natural field outbreak of CA and infectious bursal disease in a commercial poultry farm at Jos, North Central Nigeria.Gholami-Ahangaran et al. (2013) reported CAV seroprevalence in ostriches (23.38%) at Iran.

The detection of CAV antibodies in free-living wild birds in this study is indicative of previous natural exposure of these birds to the virus. This may have resulted from interactions through frequent visit to commercial poultry farms and feeding around poultry houses in this region. The scavenging of dead chickens, ingestion of contaminated water, and exposure of respiratory or conjunctival membranes to contaminated poultry dust has been suggested to be means through which wild birds could become infected. Also, in areas where chickens are reared on free range management system, and around live bird markets, these species of wild birds have been found to feed together with the chickens. These interactions allowed for possible ingestion of the virus by these birds thus, suggestive of the seroprevalence observed in this study. These birds therefore, may serve as carriers of CAV following migration to poultry houses and possible dissemination of the virus to chickens due to their migratory activities.

Conclusions

It was observed that CAV antibodies (6.0%) existed in free-living wild bird populations indicating previous natural exposure to CAV. To the best of our knowledge, this is the first attempt on the serological studies and report of CAV antibody status in Laughing dove, Speckled pigeon, Cattle egret, Village weaver and African silver bill in Nigeria.

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References

Adedeji AJ, Sati NM, Pewan SB, Ogbu KI, Adole JA, Lazarus DD, Ijiwo SJ, Okpanachi A, Nwagbo IO, Joannis TM and Abdu PA (2016). Concurrent infections of chicken infectious anemia and infectious bursal disease in 5 weeks old pullets in Jos, Plateau State, Nigeria. Vet. Science: Res. Rev., 2(3): 60-65.

Bennette S, Woods T, Liyanage WM and Smith DL (1991). A simplified general method for cluster sampling surveys of health in developing countries. World Health Statistician Quarterly, 44: 98-106.

Bhatt P, Shukla SK, Mahendran M, Dhama K, Chawak MM and Kataria JM (2011). Prevalence of chicken infectious anaemia Virus (CAV) in Commercial Poultry Flocks of Northern India: A Serological Survey. Transboundary Emerging Diseases, 58(5): 458-460.

Emikpe BO, Oluwayelu DO, Ohore OG, Oladele OA and Oladokun AT (2005). Serological evidence of chicken anemia virus infection in Nigerian indigenous chickens. Onderstepoort J. Vet. Res., 72: 101-103.

Erfan AM, Selim AA, Helmy SA, Eriksson P and Naguib MM (2019). Chicken anaemia virus enhances and prolongs subsequent avian influenza (H9N2) and infectious bronchitis viral infections. Vet. Microbiol., 230: 123-129.

Farkas T, Maeda M, Sugiura H, Kai K, Hirai K, Ostuki K and Hayashi TA (1998). A serological survey of chickens, Japanese quail, pigeons, ducks and crows for antibodies to chicken anaemia virus (CAV) in Japan.Avian Pathol., 27: 316-320.

Gholami-Ahangaran M, Fathi-Hafshejani E and Seyed-Hosseini R (2013). Seromolecular study of chicken infectious anemia in chickens, ostriches, and turkeys in Iran. J. Applied Poultry Science, 22: 404-409.

Goryo M, Hatashi S, Yoshizaida K, Umemura T, Itakura C and Yamashiro S (1989). Ultrastructure of the thymus in chickens inoculated with chicken anemia agent (MSB1-TK 5803 strain). Avian Pathol., 18: 605-617.

Haridy M, Goryo M, Sasaki J and Okada K (2009). Pathological and immunohistochemical study of chickens with co-infection of Marek's disease virus and chicken anemia virus. Avian Pathology, 38: 469-483.

Hussein HA, Saby MZ, El-Ibiary EA, El-Safty M and Abd-El-Hady AI (2002). Chicken infectious anemia virus in Egypt: molecular diagnosis by PCR and isolation of the virus from infected flocks. Arab J. of Biotechnology Science, 263(2): 268-274.

Jordan AB, Blake L, Bisnath J, Ramgattie C, Carrington CV and Oura CAL (2019). Identification of four serotypes of fowl adenovirus in clinically affected commercial poultry co-infected with chicken infectious anaemia virus in Trinidad and Tobago. Transboundary and Emerging Diseases, 66(3): 1341-1348.

Mahajan BK (1997). Method in Biostatistics for Medical Students and Research Workers. 6th Ed. Jaypee Brothers Medical Publishers Ltd, India, Pp. 88-94.

McNulty MS (1991). Chicken anemia agent: A review. Avian Pathology 20: 187-203.

Oluwayelu DO (2010). Diagnosis and Epidemiology of chicken infectious anemia in Africa. African Journal of Biotechnology, 8: 2043-2049.

Oluwayelu DO and Todd D (2008). Rapid identification of chicken anaemia virus in Nigeria backyard chicken by polymerase chain reaction combined with restriction endonuclease and analysis. African Journal of Biotechnology 7(3): 272-275.

Orakpoghenor O (2019). Chicken infectious anemia: emerging viral disease of poultry – an overview. Comparative Clinical Pathology 28(3): 651-654.

Ou SC, Lin HL, Liu PC, Huang HJ, Lee MS, Lien YY and Tsai YL (2018). Epidemiology and molecular characterization of chicken anaemia virus from commercial and native chickens in Taiwan.Transboundary and Emerging Diseases, 65(6): 1493-1501.

Rimondi A, Pinto S, Olivera V, Dibárbora M, Pérez-Filgueira M, Craig MI and Pereda A (2014). Comparative histopathological and immunological study of two field strains of chicken anemia virus. Vet. Res., 45:102-114.

Rosario K, Breitbart M, Harrach B, Segalés J, Delwart E, Biagini P and Varsani A (2017). Revisiting the taxonomy of the family Circoviridae: establishment of the genus Cyclovirus and removal of the genus Gyrovirus. Archives of Virology, 162(5): 1447-1463.

Rozypal TL, Skeeles JK, Dash JK, Anderson EJ and Beasley JN (1997). Identification and partial characterization of AikansaIzolates of chickens. Avian Diseases 41(3), 610-616.

Schat KA (2003). Chicken infectious anemia. In: Saif YM, Barnes HJ, Glisson JR, Fadly AM, McDougald LR, Swayne DE (Eds.), Disease of Poultry, 11th Edition (p. 182-202), Iowa State University Press, Ames, Iowa, USA.

Shettima YM, El-Yuguda A, Oluwayelu DO, Abubakar MB, Hamisu TM, Zanna MY, Maina MM, Andrew A and Baba SS (2017). Seroprevalence of chicken infectious anaemia virus infection among some poultry species in Maiduguri, Nigeria. Journal of Advance Veterinary Animal Research, 4(4): 384-389.

Taniguchi T, Yuasa M, Maeda M and Horiuchi T (1983). Chronological observations on hemapathological changes in chicks inoculated with chicken anemia agent. Natl Inst. Anim. Health. Q (Tokyo) 22: 61-69.

Van Dong H, Tran GTH, Van Nguyen G, Dao TD, Bui VN, Huynh LTM, Takeda Y, Ogawa H and Imai K (2019). Chicken anemia virus in northern Vietnam: molecular characterization reveals multiple genotypes and evidence of recombination. Virus Genes, doi: 10.1007/s11262-019-01686-8.

Witch JD and Maharaj SB (1993). Chicken anemia agent in South Africa. Vet Record, 133: 147-557.

Yuasa N, Taniguchi T and Yoshida I (1979). Isolation and some characteristics of an agent inducing anaemia in chickens. Avian Diseases, 23: 366-385.

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