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RESEARCH ARTICLE
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Serological evidence of chicken infectious anemia in layer and broiler chickens in Grenada, West Indies

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Abstract

Aim: Chicken infectious anemia virus (CIAV) causes immunosuppression leading to serious losses in chickens. Though CIAV has been reported in commercial chickens from many countries of the world, no information is available on CIAV from Grenada. This paper reports the result of a serological survey of CIAV in layer and broiler chickens in Grenada.

Materials and Methods: A total of 226 serum samples from layers and 233 from broiler chickens were tested for CIAV antibodies using CIAV/ELISA (IDEXX, West brook, Maine, USA).

Results: The results showed seroprevalence for CIAV in layers at 92.9% (95% confidence interval, 89.55% to 96.25%) with a parish seropositivity in the range 89.28% - 100%, whereas in broilers overall seroprevalence was 58.3% (95% confidence interval, 51.97% to 64.63%) with a range of 2.85%-92.85%, according to parish.

Conclusion: A high prevalence of antibodies to CIAV in commercial chickens indicates a CIAV contaminated environment in Grenada. This in turn emphasizes the need for vaccination of chickens against CIAV and further research on the impact of this disease in Grenada.

Keywords: antibodies, Chicken infectious anemia virus, chicken, ELISA, Grenada.

Introduction

Chicken infectious anemia (CIA) which was first reported in Japan [1], is caused by chicken infectious anemia virus (CIAV), recently classified as the sole member of the genus Gyrovirus belonging to family Circoviridae [2]. The disease can be diagnosed by detecting virus specific antibodies, detecting infectious virus, virus antigen, and virus DNA. However, reports on the prevalence of CIAV are mainly based on serological tests as reported by affected countries; namely Sudan [3], Iran [4,5], Jordoan [6], India [7,8,9], Egypt [10], Croatia [11], Turkey [12] Nigeria [13], and the USA [14]. CIAV infection causes aplastic anemia, generalized lymphoid atrophy and immunosuppression [15,16]. Since CIAV leads to immune-suppression, the virus plays a key role in many bacterial, viral and fungal infections. The virus is transmitted vertically and horizontally. Horizontally acquired infections usually remain subclinical which in turn manifests itself with its poor performance [16-19] . The authors of this communication are not aware of any previously published information on chicken infectious anemia in Grenada and other countries in the Caribbean. The objective of this study was to estimate the sero-prevalence for CIAV in commercial chickens in Grenada.

Materials and Methods

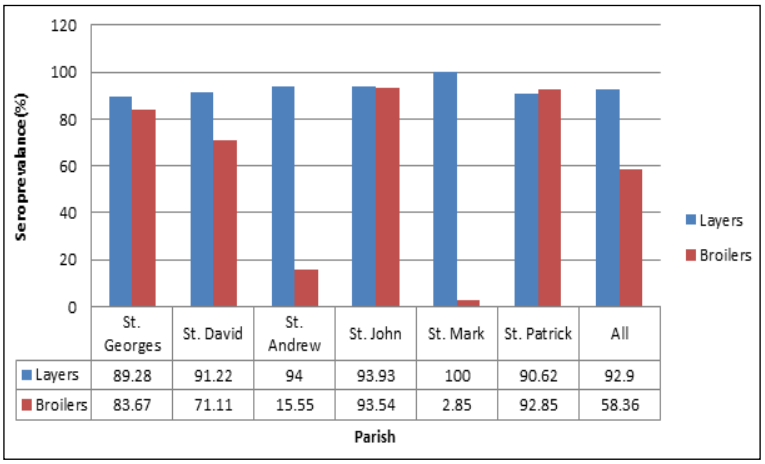
Ethical approval: The project was approved by Institutional Animal care and use committee of the St. George's University, Grenada.

A total of 226 blood samples from layer chickens and 233 from broilers were collected in various parishes of mainland Grenada. The age of the layers varied between 12 and 16 months and for broilers it varied between 6 and 7 weeks of age. Blood from layers was collected by brachial venipuncture and in the case of broilers, blood was collected at the time of their slaughter. A minimum of 25 blood samples were taken separately from layer and broiler flocks in each parish. Blood was transported in cooler boxes to the pathology laboratory of the school of veterinary medicine within 2 hours of collection. Serum was obtained after centrifugation of blood samples at 2000g. Sera were tested for CIAV antibodies using a commercial CIAV/ELISA kit (IDEXX West brook, Maine, USA), following the instructions of the manufacturer.

Statistical analysis: Confidence intervals were calculated with the help of the following website, (http://www.mccallumlayton.co.UK/states/confidence intervalCalcProportion.aspx)

Results and Discussion

We found overall seroprevalence for CIAV in layers at 92.9% (95% confidence interval, 89.55% to 96.25%) with a parish seropositivity range of 89.28% - 100%, whereas in broilers overall seroprevalence was



	St. Georges	St. David	St. Andrew	St. John	St. Mark	St. Patrick	All
Layers	89.28	91.22	94	93.93	100	90.62	92.9
Broilers	83.67	71.11	15.55	93.54	2.85	92.85	58.36

Figure-1. Seroprevalence of Chicken infectious anaemia antibodies in commercial chickens of Grenada

58.3% (95% confidence interval, 51.97% to 64.63%) with a range of 2.85% - 92.85%, according to parish (Figure-1). Our results for higher seroprevalence in layer chickens compared to broilers are supported by the observation of previous researchers (Ballal [3], Bhatt et al. [7], Owoade et all. [20], Kuyucuoglo et al. [21]. Owoade et al. [20] reported high seroprevalence of 83% - 100% in layer and pullets than the broilers (16.7% - 89.2%) in Nigeria, Hadimili et al. [12] found antibodies in 85.7% in commercial layers in Turkey, while Ballal [3] reported antibodies to CIAV in 67.3% commercial layer and 44.3% in broiler flocks in Sudan. High degree of positive detection (87.5% was also made by ELISA in 21 commercial layer flocks in Turkey by Kuyucuoglu et al.[21]. Farhoodi et al.[4] found 71.8% positive antibody detection among broiler flocks in Iran, Roussan [6] reported 82.6% positive detection for CIAV in broilers in Jordan. In India an overall prevalence of 86.88% with a higher prevalence in breeders were recorded in poultry flocks in four Northern states of the country, namely Punjab, Haryana, Uttarakhand and Uttarpradesh [7]. Cardona et al. [22] have also indicated higher rate of seroprevalence in sexually mature flocks. The observation of Owoade et al. [20] is similar to our observation of age related seroprevalence in broiler flocks. They detected antibodies against CIAV in 86% of broilers comprising of juveniles and in 100% of flocks older than 6-8 weeks. Similarly in Croatia presence of antibodies against CAV in 94.7% broiler breeders against 26.65% in broilers were found [11]. Birds living longer are susceptible to horizontal infection of CIAV. Chicks infected by contact do not develop clinical disease but remain subclinical [23]. McNulty et al. [17] reported for the first time a substantial statistically significant effect on profitability and performance of broiler flocks with subclinical CIAV infection. This was later supported by others [1,19]. The reason for poor performance in subclinical CIA is unclear, but many researchers point to immunosuppressive effect of CIAV [24,25]. In our study no correlation for the presence of antibodies for CIAV to flock performance in commercial chickens in Grenada was made.

Clinical disease occurs comparatively infrequently in vertically transmitted CIAV infection and clinical signs develop from 10-14 days of age [17]. Affected birds develop anemia-dermatitis syndrome [18,26,27]. However, for the past 2 decades the breeder flocks are being immunized and the vertical transmission from immune breeders has been reduced to a very low level. Commercial chickens in Grenada are not vaccinated against CIAV and absence of any report on anemia –dermatitis syndrome in chickens at their young age in Grenada points to the possibility of the virus circulating in the poultry houses and infecting birds horizontally. This is further exacerbated by the existing management system of keeping multiage chicken in Grenada which supports the infection between birds.

As far as our knowledge, this is the first report on the presence of antibodies for CIAV in commercial chickens in Grenada and countries in the Caribbean region.

Conclusion

Our findings show that chicken infectious anemia virus is widely distributed in commercial layer and broiler chickens in Grenada.

Recommendation

Since the virus is immunosuppressive alone or in combination with other viruses, extensive studies are warranted to find out the economic impact of CIAV in chickens of this region.

Authors' Contributions

DT and GS: collection of samples from field. AC and KT: conducted ELIZA test. RNS: preparation of project and overlook all aspects of the project. MIB: draft and revision of manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

References

1. Yuasa, N., Taniguch, T., Yoshida, I. (1979) Isolation and some characteristics of an agent inducing anemia in chicks. *Avian Dis.* 23: 366-385.
2. Pringle, C. R. (1999) Virus taxonomy at the xi[th] International Congress of Virology, Sydney, Australia. Arch.Virol. 144: 2065-2069.
3. Ballal, A., Elhussein, A. M. and Igbal Abdeirahim, S. A. (2005) Serological survey of chicken Infectious anemia in commercial chicken flocks in Khartoum state Sudan *J. Anim Vet Adv.* 4 (7): 666-667.
4. Farhoodi, M., Toroghi, Bassami, R., Kianizadeh, M. R.(2007) Chicken infectious anemia virus infection among broiler chicken flocks in Iran, *Archieves of Razi Institute* 62: 1-6.
5. Gholami-Ahangaran, M. and Zia-Jahromi, N.(2012) Chicken anemia virus infection in broiler chickens vaccinated and not vaccinated for avian influenza in Iran. *Appl. Poultry. Res.* 21: 423-417.
6. Roussan, D. A. (2006) Serological survey on the prevalence of chicken infectious anemia virus in commercial broiler chicken flocks in Northern Jordan. *Int. J. Poult Sci.* 5 (6): 544-546.
7. Bhatt, P., Shukla, S. K., Mahendran, M., Dhama, K., Chawak, M. M., Kataria, J. M. (2011) Prevalence of chicken infectious anemia virus (CIAV) in commercial poultry flocks of Northern India: A serological survey. *Transboundary and Emerging Dis.* 58, 458-460.
8. Khanna, S. K. (2010) Emerging diseases of poultry: newer and cheaper methods of diagnosis and treatment. *Poult. Technol.* 5: 68-71.
9. Dhama, K., Mahendran M., Somvanshi, R., and Chawak, M. M. (2008) Chicken infectious anemia virus: an immunosuppressive pathogen of poultry- A review. *Indian J. Vet Pathol*. 32, 158-167.
10. Hegazy, A. M., Abdallah, Abd-el Samie, L. K. and Nazim, A. A. (2010) Chicken infectious anemia (CIAV) in broilers and laying hens in Sharkia province, Egypt. *Journal of Am. Sci.* 6 (9) 752-761.
11. Bidin, M. Savic Vladimir, Bidin Z., Balenovic M., Majnaric D. (2010) The prevalence of antibodies against chicken anemia virus in unvaccinated broiler and broiler breeder s in Croatia. *Veterinarski Archiv* 80 (6): 753-760
12. Hadimili Hoseyin, H., Erganis O., Goler Leyla, Ucan U. Sait. (2008) Investigation of chicken infectious anemia virus infection by PCR and ELISA in chicken flocks. *Turk. J. Vet. Anim. Sci* 32 (2) 79-84.
13. Oluwayelu, D. O. (2010) Diagnosis and epidemiology of chicken infectious anemia in Africa. *African J. Biotech.* 9(14): 2043-2049.
14. Toro, H., Ewald S. and Hoerr, F. J. (2006) Serological evidence of chicken infectious anemia virus in the United States at least since 1959. *Avian Dis.* 50: 124-126.
15. Schat, K. A. (2003) Chicken infectious anemia. In: Diseases of poultry. Ed. Saif, Y. M. et al. Iowa State press. Pp 182-202.
16. Toro, H., Van Santen, V. l., hoerr, F. J.,Breedlove, C. (2009) Effects of chicken anemia virus and infectious bursal disease virus in commercial chickens. *Avian Dis.* 53: 94-102.
17. McNulty, M.S., McIlroy, S. G., Bruce, D. W., Todd, D. (1991) Economic effects of subclinical Chicken anemia agent infection in broiler chickens. *Avian Dis*. 35: 263-268.
18. Chettle, N. J., Eddy, R. K., Wyeth, P. J., Lister, S. A. (1989) An outbreak of disease due to chicken anemia agent in broiler chickens in England. *Vet Rec.* 124: 211-215.
19. McIlroy, S. G., McNulty, M. S., Bruce, D. W., Smyth, J. A., Goodall, E. A., Alcorn, M. J. (1992) Economic effects of clinical chicken anemia agent infection on profitable broiler production. *Avian Dis.* 36: 566-574.
20. Owoade, A. A., Oluwayolu,D. O,, Fagbohun O. A.,Ammeriaan, W., Mulders, M. N., Muller, C. P. (2004) Serologic evidence of chicken infectious anemia in commercial flocks in Southern Nigeria. *Avian Dis.* 48: 2002-205.
21. 21. Kuyucuoglu, V., Hadimili, H. H., Kenar, B., Ucan U. S. (2003) Detection of chicken infectios anemia virus antibody in layer operations by using ELISA in Afyon region. *Vet. Hek. Microbiyol. Derg*. 3: 21-26.
22. Cardona, C.I., Lucio, B., O'Conell,P., Jagne, J., Schat, K. A. (2000) Humoral immune response in chicken infectious anemia virus in three strains of chickens in a closed flock. *Avian Dis.* 44: 661-667.
23. De Herdt, P., Van den Bosch, G., Ducatelle, R., Uyttebrock, E., Schrier, C. (2001) Epidemiology and significance of chicken infectious anemia virus infection in broilers and broiler parents under non vaccinated and European circumstances. *Avian Dis*. 45: 706-7-8.
24. Box, P. G., Homes, H. C., Bushell, A. C., Finney, P. M. (1988) Impaired response to killed Newcastle disease vaccine in chicken possessing circulating antibody to chicken anemia agent. *Avian Pathol.* 17: 713-723.
25. Otaki, Y., Nunoya, T., Tajima, M., Kato, A., Nomura, Y. (1988) Depression of vaccinal immunity to Marek's disease by infection with chicken anemia agent. *Avian Pathol.* 17: 333-347.
26. Jorgensen, P. H. (1991) Mortality during an outbreak of blue wing disease in broilers. *Vet Rec*. 129: 490-491.
27. Vielitz, E. and Landgraf, H. (1988) Anemia-dermatitis of broilers: field observations and its occurrence, transmission and prevention. *Avian Pathol.* 17: 113-120.

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