

Serological Survey of the Newcastle Disease and Infectious Bursal Disease in Local Ducks and Local Guinea Fowls in Jos, Plateau State, Nigeria

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Key words

Poultry – Duck – Guinea fowl – Newcastle disease – Gumboro disease – Nigeria.

Summary

A serological survey was conducted to determine the prevalence of Newcastle disease (ND) and infectious bursal disease (IBD) antibodies in local ducks and local guinea fowls brought from different locations within Plateau State and neighboring areas to be sold at Yankaji, a poultry market in Jos. The hemagglutination inhibition test and agar gel immunodiffusion test were used to diagnose ND and IBD, respectively. Results indicated that out of the 165 serum samples collected from ducks, 11 (6.7%) had antibodies against the ND virus. Similarly, out of the 205 serum samples collected from guinea fowls, 28 (13.6%) had antibodies against the ND virus. All sera from ducks and guinea fowls were negative for IBD antibodies. It was concluded that both local ducks and guinea fowls had been exposed to the Newcastle disease virus but not to the infectious bursal disease virus.

■ INTRODUCTION

For the past few decades, poultry production has become increasingly organized, specialized and integrated into an industry of major national and international importance. Though the high price of poor quality feeds has adversely affected the cost of poultry production in Nigeria, diseases constitute one of the major factors that can limit production (10). Some of the common diseases that have been of great concern include the Newcastle disease (ND), Marek's disease, chronic respiratory disease, infectious bursal disease (IBD), fowl typhoid, coccidiosis, and other diseases associated with ectoparasites such as mites and lice, which constantly inflict high mortality and drop in egg production in commercial flocks with high yields (1, 10, 12).

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More or less all ages of different species of birds are susceptible to ND, although substantially less with advancement to maturity (5). The acute and virulent form may result in 90% mortality or more in affected flocks (3). The primary mode of transmission of the Newcastle disease virus (NDV) within a flock is by aerosol. Within two days after exposure and a day before showing clinical signs of the disease, the infected birds begin to release the virus into the air through nasal secretions or feces (15, 26). The ability of ND to affect not only poultry and other birds, but also man and other mammals, magnifies the potential as well as the acute threat from NDV.

Despite the widespread use of the ND vaccine by poultry farmers, the disease has continued to be one of the most devastating diseases of poultry in terms of morbidity and mortality. Outbreaks of ND in vaccinated flocks have been reported in Nigeria (13, 25).

IBD is an acute contagious viral disease of poultry characterized by the inflammation of the bursa of Fabricius with its conspicuous enlargement (7). All breeds of chickens are susceptible, with those between 2-7 weeks being most susceptible (19). However, IBD has been reported in 20-week-old birds (8). Mortality in pheasants has been reported to range between 2 and 80% (16), and Onunkwo (23) reported mortality to reach 100% in chickens. This high mortality is also attributed to other complications such as salmonellosis, coccidiosis, etc. (2, 16). The immunosuppression precipitated by damage to the bursa of Fabricius in survivors and subclinically infected chickens results in increased susceptibility to the other diseases (2).

Newcastle and infectious bursal diseases are the two most dreaded viral diseases of poultry in Nigeria. Over the years, attempts at controlling them have not been very successful. Sporadic outbreaks are still common among free roaming village chickens as well as commercial flocks (14). The circulation of the causative virus among free roaming and wild birds has been reported to be one of the factors responsible for the sporadic outbreaks of ND and IBD (21). Furthermore, NDVs were isolated from specimens collected from affected ducks and guinea fowls during outbreaks in the country (9, 17).

The local ducks and local guinea fowls are reared under a relatively uncontrolled extensive system of management. Hence their proximity to and actual contact with exotic commercial poultry strongly suggest that they could play a role in the transmission of infectious diseases of poultry (2, 21). In this study, an attempt was made to detect ND and IBD antibodies from the sera of healthy local ducks and local guinea fowls in Jos, Plateau State, Nigeria.

■ MATERIALS AND METHODS

Survey population

A total population of 165 local ducks and 205 local guinea fowls were screened for ND and IBD between January and May 2002. The birds were brought by local farmers in need of money from different locations within Plateau State and its surrounding area to be sold at Yankaji, a poultry market in Jos, for slaughter, processing and marketing. Their ages could not be determined. Whole blood was collected into sterile labeled vaccine vials during bleeding process when the jugular vein was severed using a sharp clean knife during the slaughter.

Preparation of sera

The whole blood collected from ducks and guinea fowls was identified and allowed to clot under atmospheric conditions.

The serum was decanted and clarified by centrifugation at 1000 rpm for 15 min. The clear serum was stored at -20°C until used.

Agar gel immunodiffusion test

The agar used for the immunodiffusion technique was purified agar. The salt used was sodium chloride salt. Sodium azide was used as preservative to inhibit microbial growth.

Hemagglutination inhibition test

The standard ND antigen used was LaSota ND vaccine produced at the Virology Laboratory of the National Veterinary Research Institute (NVRI), Vom, Plateau State, Nigeria. The antigen was produced by large scale aseptic propagation of the virus. The live virus was grown in the allantoic cavity of fowl eggs. It contained a minimum of 10^{3.2} embryo infective dose (EID 50) per bird dose. The positive control NDV antiserum used in the hemagglutination inhibition test was the serum raised to the reference ND antigen. Chicken red blood cells for the test were obtained from healthy NDV susceptible birds.

Serology of Newcastle and infectious bursal diseases

Antibodies to ND were detected by the hemagglutination inhibition technique as described by Clark and Casel (6). Antibodies to IBD in the sera were determined by the agar gel precipitation technique as described by Phillips (24).

■ RESULTS

Out of the total number of serum samples examined for NDV antibodies in ducks, 11 (6.7%) were positive, while none had antibodies against the infectious bursal disease virus (IBDV) (Table I). Of the total serum samples tested for the presence of NDV antibodies in guinea fowls, 28 (13.6%) were positive. None had antibodies against IBDV (Table I).

■ DISCUSSION

The results of the serological survey indicated that local ducks and local guinea fowls marketed and slaughtered in Jos metropolis had antibodies against ND. This finding tends to agree with an earlier report by Ibu et al. (14) who showed prevalence rates for ND of 1.7% in ducks and 15.0% in guinea fowls under similar sampling circumstances and while using the same method of serological survey as that in the present study but with a smaller sample size.

Table I

Antibodies against viruses of Newcastle and infectious bursal diseases in local ducks and local guinea fowls

Poultry type	Num. samples tested	Num. samples positive for NDV antibodies (%)	Num. samples positive for IBDV antibodies
Ducks	165	11 (6.7)	0
Guinea fowls	205	28 (13.6)	0

NDV: Newcastle disease virus

IBDV: infectious bursal disease virus

The presence of ND virus antigens in apparently healthy birds indicated the possibility of these birds acting as healthy carriers of ND (18). Although a fatal outbreak of ND among guinea fowls has been reported (20), these species of birds seem to be more resistant to ND than chickens. Oladele et al. (22) reported negative results of ND in guinea fowls in Zaria. Furthermore, the duck is known to be more resistant to ND than the domestic chicken and turkey (17). However, Gomwalk et al. (11) found high prevalences of 16.0 and 9.0% in ducks and guinea fowls, respectively, while Oladele et al. (22) observed a prevalence rate up to 16.7% in ducks in Zaria. As the guinea fowls and ducks were allowed to roam freely in the vicinity along with chickens, the presence of NDV in the former could pose a threat of disease outbreak in the latter, particularly in the exotic/commercial breeds of birds that are managed intensively. Worse yet was the fact that ducks and guinea fowls were not vaccinated.

The presence of ND antibodies in the sera of ducks and guinea fowls in this study was an indication of previous exposure of these birds to the virus. Since these birds were not routinely vaccinated, they might have been exposed to natural infection in the field. All the sera of ducks and guinea fowls examined in Jos poultry market were negative for antibodies against IBDV (Table I). This is in consonance with earlier observations using the same serological

technique as that in this study, which showed negative IBDV antibodies in the sera of ducks and guinea fowls (14, 18, 22), although Ibu et al. (14), who conducted the work in the same area, considered only 120 serum samples and 40 rectal swabs. Furthermore, the disease is known to have occurred in chickens only (4). Nawathe et al. (18) reported that antibodies against IBDV were widely spread in both intensively-managed and free-range domestic chickens. This indicated that chickens were more susceptible to the virus than ducks and guinea fowls, since no specific antibodies against IBD were detected in either ducks or guinea fowls in this study.

■ CONCLUSION

On the basis of this study, local ducks and local guinea fowls appeared to constitute foci of infections, serving as biological vertebrate vectors for NDV transmission to the more susceptible avian species. On the other hand, ducks and guinea fowls were resistant to IBD, and, therefore, they may not act as carriers in the epidemiology of IBD infections. There is the need to introduce a vaccination program for local birds and to restrict their movements/interactions with commercial poultry by fencing farm premises, as well as to conduct further research on the epidemiology of infectious diseases in local birds.

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Résumé

Mai H.M., Ogunsola O.D., Obasi O.L. Enquête sérologique sur la maladie de Newcastle et la maladie de Gumboro chez les canards et les pintades indigènes de Jos, dans l'Etat du Plateau au Nigeria

Une enquête sérologique a été menée pour déterminer la prévalence d'anticorps contre la maladie de Newcastle (MN) et contre la maladie de Gumboro (MG) chez des canards et des pintades indigènes provenant de différentes localités au sein de l'Etat du Plateau et de sa périphérie, pour être vendus à Yankaji, un marché de volailles de Jos. La réaction d'inhibition de l'hémagglutination et le test d'immunodiffusion en gélose ont été utilisés pour le diagnostic respectivement de la MN et de la MG. Les résultats ont montré que sur les 165 échantillons de sérum prélevés sur les canards, 11 (6,7 p. 100) avaient des anticorps contre le virus de la MN. De même, sur les 205 échantillons de sérum prélevés sur les pintades, 28 (13,6 p. 100) avaient des anticorps contre le virus de la MN. Les sérums de tous les canards et de toutes les pintades ont été négatifs pour les anticorps anti-MG. Il ressort de cette étude que les canards ainsi que les pintades indigènes de la région ont été exposés au virus de la ND mais pas à celui de la MG.

Mots-clés : Volaille – Canard – Pintade – Maladie de Newcastle – Maladie de Gumboro – Nigeria.

Resumen

Mai H.M., Ogunsola O.D., Obasi O.L. Encuesta serológica de la enfermedad de Newcastle y de la bursitis infecciosa en patos locales y gallinas de Guinea locales en Jos, estado de Plateau, Nigeria

Se llevó a cabo una encuesta serológica para determinar la prevalencia de anticuerpos contra la enfermedad de Newcastle (EN) y la bursitis infecciosa (BI), en patos y gallinas de Guinea traídos de diferentes sitios dentro del estado de Plateau y las áreas vecinas, para ser vendidos en Yankaji, un mercado de aves en Jos. El test de inhibición de la hemoaglutinación y el test de inmunodifusión en agar gel fueron utilizados para diagnosticar EN y BI, respectivamente. Los resultados indican que de los 165 sueros colectados de patos, 11 (6,7%) presentaron anticuerpos contra el virus de la EN. De la misma manera, de los 205 sueros recolectados de gallinas de guinea, 28 (13,6%) presentaron anticuerpos anti virus de la EN. Todos los sueros de patos y de gallinas de guinea fueron negativos para anticuerpos contra BI. Se concluye mediante este estudio que ambos los patos y las gallinas de Guinea locales han estado en contacto con el virus de la enfermedad de Newcastle pero no con el virus de la bursitis infecciosa.

Palabras clave: Ave de corral – Pato – Gallina de Guinea – Enfermedad de Newcastle – Enfermedad de Gumboro – Nigeria.