

Response of Domestic Pigeons (*Columba livia*) to Experimental Infection with Chicken Isolate of Infectious Bursal Disease (IBD) Virus

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ABSTRACT

The susceptibility of pigeons (*Columba livia*) to chicken isolate of infectious bursal disease (IBD) virus was investigated under arid zone condition. Thirty pigeons, 15 adults and 15 young ones were acquired from the Maiduguri Monday Market and some households in Maiduguri. The pigeons were divided into two groups thus: Group A, which is the experimental group and consisted of ten (10) adults and ten (10) young pigeons. Group B that served as the control group was made up of five (5) adults and five (5) young pigeons. Pigeons in group A were infected with 3 drops of IBD virus inoculum orally while those in group B were given same quantity of normal saline per os. All the pigeons in groups A and B did not manifest any clinical sign throughout the period of the study. However, some of the serum samples from the infected group were positive for presence of precipitin antibody on day 7 and 14 PI, while all the samples became negative on 21 days PI. The study revealed that pigeons (young and adults) are resistant to experimental infection with chicken isolate of IBD virus. However, the birds seroconverted following exposure to the virus despite the absence of clinical signs. This showed that there was "virus take" following exposure of the species to IBD virus. The possible role of pigeons in the epidemiology of IBD in Nigeria need to be further investigated.

Key words: Domestic pigeon, experimental infection, IBD virus

INTRODUCTION

Livestock farming is an important sector of economy of many developing countries. It is obvious that the problem for the developing world is low level of livestock production with increasing demands for livestock and its product due to the rapid population growth. Poultry industry is as emerging agri- business and has established its position as the fastest growing segment in the agricultural sector. With increasing acceptance of chicken, egg and meat, the demand for these products is ever increasing. Poultry industry has tremendous opportunity in reducing unemployment problems of the country. The growth of this profitable sub sector is often interrupted by a number of infectious and contagious diseases. Infectious bursal disease (IBD) commonly known as "Gumboro" disease is an important disease of poultry. The growth of the poultry industry is currently challenged by IBD that appears to be fatal among infected poultry throughout the world.

Recently the lack of a proper understanding of the epidemiology of the disease, especially the likely role of other avian species and specifically those raised in close proximity with chickens (such as pigeons), has attracted a lot of attention (Ambali, 1997; Ambali *et al.*, 1991; Ambali *et al.*, 2002; Nawathe *et al.*, 1978). The contributions of these avian species in the spread of IBD virus could be additional factor that may probably be responsible for the inability to successfully control/eradicate the disease from poultry flocks in Nigeria.

Serological evidence of IBD in domestic pigeons that had contact with infected commercial or rural chickens

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and/or their droppings have been revealed (Ambali *et al.*, 2002). This study was designed to examine the susceptibility of pigeons to chicken isolate of IBD virus.

MATERIALS AND METHODS

Experimental pigeons

Thirty pigeons (15 young and 15 adults) were used for the experiment. They were acquired from the Maiduguri Monday Market and some households in Maiduguri. The adults were fed with millet, guinea corn and groundnut, while the young ones were fed with a mixture of chick mash, cereal (grains) and water. All the birds were allowed to acclimatize for 2 weeks before subjecting them to experimental treatments.

The challenge virus

Frozen infected carcasses of chicks that died from suspected case of IBD were obtained from NVRI, Vom, Nigeria. The bursae of Fabricius were removed from them, and washed with normal saline containing procaine penicillin and streptomycin. Each bursae of Fabricius was then cut into pieces before grinding with sterile pestle and mortar. Sterile sand was added to facilitate grinding. A 10% (W/V) suspension of the bursa was made in sterile normal saline. The suspension was then tested for presence of IBD virus using agar gel precipitation test (AGPT) by dispensing a drop of the bursal homogenate into the peripheral wells of the AGPT agar plate with IBD positive antiserum added into the central well. All the wells containing the antigen showed precipitin line with the positive serum.

Experimental grouping and treatment

The pigeons were divided into 2 groups (A and B). Group A served as the experimental group and consisted of 20 pigeons (10 young and 10 adult). All the pigeons in group A were infected with 3 drops of IBD virus orally. While group B which served as the control group was made up of 5 young and 5 adult pigeons and were given 3 drops of normal saline orally.

Collection of samples

Blood samples for serology were collected on days 0, 7, 14, and 21 post- infection (PI).

Collection of serum

Each pigeon was bled from the wing vein using sterile 2 ml syringes and 23 gauge needles. The blood from each pigeon was collected separately into a sterile container and was allowed to clot in a slanting position at room temperature and serum was then separated by centrifugation at 1500 rpm for 10 minutes. The serum samples were stored in sterile Nunc tubes at -20°C until tested.

Serological test

The sera collected from the experimental birds were assayed for the presence of antibodies using AGPT. Also the detection of IBD virus antigen from bursae of Fabricius of sacrificed pigeon was carried out using AGPT. The AGPT was performed as earlier described by Hirai *et al.* (1972).

Clinical examination

All the pigeon were monitored for clinical signs soon after infection. Any sign typical of IBD observed in any of the pigeons were recorded.

Pathological examination

The carcasses of sacrificed pigeons were systematically examined soon after death. They were checked for gross lesions and tissue samples (bursa of Fabricius, muscle and proventriculus) were taken and fixed in 10% formalin. Sections were made from the paraffin embedded tissues and stained with haematoxylin and eosin following the procedure of Baker and Silvertown (1985) for the determination of histopathological changes.

Data analysis

Data obtained from the experiments were analyzed using simple percentage.

RESULTS

Clinical findings

The infected pigeons did not manifest any clinical sign typical of IBD throughout the 21-day period of the study.

Post-mortem findings

Post-mortem examination carried out on sacrificed pigeons did not reveal any gross lesion indicative of IBD. The bursa of Fabricius (BF) from the sacrificed infected pigeons presented with histopathological lesions typical of changes observed in IBD, which included lymphocytolysis of the bursal follicles and moderate oedema of the interfollicular spaces of the BF.

Serological finding

Out of the 20 serum samples collected from the infected pigeons 12 (60%) were positive on day 7 PI and by day 14 PI only 8 samples (40%) were found to be positive. All the samples were negative for antibodies against IBD virus on day 21 PI (Table 1).

Table 1. Precipitin antibody response of domestic pigeons to experimental infection with chicken isolate of IBD virus

Days post-infection	No. of infected birds	No. of AGPT positive birds	% of positive birds
0	20	0	0
7	20	12	60
14	20	8	40
21	20	0	0

DISCUSSION

This study revealed that pigeons (both young and adults) are resistant to experimental infection with chicken isolate of IBD virus. This finding agrees with the earlier reports by Vindevogel (1979) and Fritzche *et al.* (1981). However, the pigeons seroconverted following exposure to the virus despite the absence of clinical signs. Similar findings were observed in other species of poultry such as cortunix quails and some breeds of turkeys (Abdu *et al.*, 1985). Although these species of birds were successfully infected with IBD virus, there was no clinical sign or pathological lesions in their bursa of Fabricius and no virus was isolated from their cloacal swabs. However, precipitin and virus neutralizing antibodies were detected in sera collected from them (Weisman and Hitchner, 1978). Similarly, serological evidence of high prevalence of IBD in free range chickens and guinea fowls in which clinical disease is rarely observed has been reported from various parts of the country (Nawathe *et al.*, 1978; Umoh *et al.*, 1982; Abdu *et al.*, 1985; Ambali and Aliyuda, 1991/92; Akoma and Baba, 1995).

The birds seroconverted following experimental infection which is indicative of virus replication in the infected birds and stimulation of immune response. Pigeons could serve as sources of spread and/or amplification of infection for susceptible host.

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