# INFECTIOUS BURSAL DISEASE IN LIVE-BIRD MARKET AND SMALLHOLDING BIRDS IN TWO STATES OF SOUTHWEST NIGERIA

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**ABSTRACT**. Ever since infectious bursal disease (IBD) was recognised in Nigeria over forty years ago, it continues to pose a threat to poultry production with limited information on the likely role of other avian species especially those raised in close proximity with chickens. For this study, blood samples were obtained from 184 unvaccinated apparently healthy birds comprised of Japanese quails (63) and indigenous chickens (60) on smallholdings as well as pigeons (61) in a live-bird market in Osun and Oyo states, southwest Nigeria. Sera from these birds were analysed for IBD virus antibodies using a commercial ELISA kit. Overall, 69 (37.5%) sera were positive for IBDV with 52.8% (65/184) and 6.6% (4/184) from birds on smallholdings and live-bird market, respectively. These findings indicate that these birds were sub-clinically infected and could serve as reservoirs shedding the virus into the environment and perhaps, corroborate the suggestion that the inability to effectively control or eradicate the disease from poultry flocks in Nigeria may be due to limited information on the contributions of other avian species other than chicken in the spread of IBD virus.

*Keywords*: infectious bursal disease, antibodies, smallholding birds, live-bird market

## INTRODUCTION

Infectious bursal disease (IBD) is a highly contagious viral infection of young chickens (3-6 weeks) which has been viewed as one of the most fatal diseases of poultry. Nevertheless, few outbreaks of IBD have also been reported in older birds of up to 20 weeks (Durojaiye *et al.,* 1984). This disease is caused by IBD virus (IBDV); a bisegmented, non-enveloped, double stranded RNA virus that belongs to the genus *Avibirnavirus* of the family Birnavirideae and is known to persist in contaminated premises because the virus is naked and resistant to harsh environment (Okoye, 1984). Two serotypes of IBDV exist, namely: serotype 1 which is pathogenic for poultry, and serotype 2, which is apathogenic and has been isolated from chickens and turkeys (Van den Berg *et al.,* 2000). The IBD virus has two major structural proteins (VP2 and VP3) of importance and both contain epitopes that are responsible for group antigenicity (Becht *et al.,* 1988). The VP2 carries the

epitopes which elicit neutralising antibodies and distinguish the two serotypes as well as those which elicit non-neutralising antibodies and are common to both serotypes (Cruz-Coy *et al.,* 1993).

Infectious bursal disease affects the immune system of poultry and has constituted a serious problem for the poultry industry, causing significant losses due to secondary infections and growth retardation. Also, it lowers egg production, leads to deterioration of egg shell and internal egg quality (Ashraf *et al.,* 2005). Moreover, the immunosuppressive nature of IBD infection has been suggested to cause vaccination failure against other viral infections such as Newcastle disease.

Ever since IBD was recognised in Nigeria over forty years ago (Ojo *et al.,* 1973), it continues to pose a threat to poultry production. Although chickens are reported to be the most susceptible poultry species to clinical infection with IBD virus (OIE, 2008), serological evidence of the infection has been reported in other avian species such as Francolins (Oluwayelu *et al.,* 2014), village weaver (Nawathe *et al.,* 1978) and guinea fowls (Ambali *et al.,* 2004). More so, despite the availability and use of vaccines against IBD, there have been reports of disease outbreaks in susceptible poultry (Ibrahim *et al.,* 2003; El-Yuguda and Baba, 2004). The limited information on the likely role of other avian species (Oluwayelu *et al.,* 2014) especially those raised in close proximity with chickens has attracted a lot of attention. Therefore, this study was carried out to investigate the presence of infectious bursal disease virus antibodies in Japanese quails and indigenous chickens on smallholdings as well as pigeons in a live-bird market in Osun and Oyo states, southwest Nigeria.

## MATERIALS AND METHODS

### Sample animals and collection

A total of 184 unvaccinated apparently healthy birds were used in this cross sectional study. The market birds comprised of 61 pigeons from Oja-Oba bird market in Oyo state, while birds on smallholdings include 63 Japanese quails from three flocks in Ikire, Osun state and 60 indigenous chickens from five rural areas in Igangan, Oyo state. While the ages of the pigeons were guessed to be over 6 months by the traders, the quails and indigenous chickens were estimated to be about 12 months old.

About 2 ml of blood was collected through the jugular vein of each bird. The blood samples were then centrifuged to obtain sera. The sera were stored at –20 °C until tested.

### Serology

A commercial enzyme-linked immunosorbent assay (ELISA) kit (Green Spring, China) was used to detect IBDV- VP2 antibodies in the collected sera samples. The test procedure was carried out according to the manufacturer's instructions and the optical density (OD) values were read using an ELISA reader at double wavelength of 450 and 630 nm. The result was judged by the sample/positive (S/P) value using;

$$S/P = \frac{\text{Sample OD} - \text{Negative control OD}}{\text{Positive control OD} - \text{Negative control OD}}$$

Samples with S/P ≥ 0.2 and less than 0.2 were considered positive and negative respectively

## RESULT

An overall seroprevalence of 37.5% (69/184) was observed in this study. Antibodies to IBDV were significantly higher in birds on smallholdings compared to live bird markets, with odds ratio of 16.0 (95% CI: 5.5-46.7) (Table 1). Specifically, seroprevalence of 14.3, 93.3 and 6.6% was observed in Japanese quails, indigenous chickens and pigeons, respectively. Of the 123 birds on smallholdings, IBDV antibodies were significantly higher with odds ratio of 84.0 (95% CI: 24.4-289.0) in indigenous chickens compared to Japanese quails (Figure 1). During sample collection, it was observed that there was little or no biosecurity and hygiene measures at the smallholding bird flocks whereby farm handlers indiscriminately enter the pens sometimes with soiled and probably contaminated shoes and equipment. Also, the pigeons were held in cages kept near chickens and other birds.

**Table 1.** Seroprevalence of infectious bursal disease virus antibodies at the different sources sampled

| | Positive (%) | Negative (%) | Total |
|---|---|---|---|
| **Smallholding farms** | 65 (52.8)* | 58 (47.2) | 123 |
| **Live bird market** | 4 (6.6)* | 57 (93.4) | 61 |
| | 69 (37.5) | 115 (62.5) | 184 |

* Statistically significant. P< 0.0001, OR = 16.0 (95%CI: 5.5-46.7)

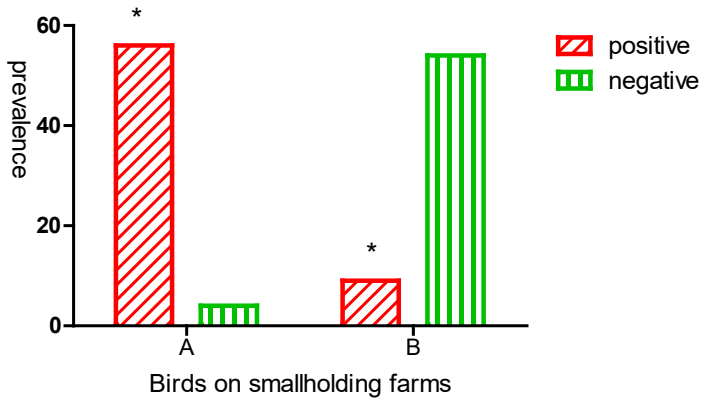


**Figure 1.** Seroprevalence of infectious bursal disease virus antibodies in birds on smallholding; A: Indigenous chickens B: Japanese quails
[P< 0.0001, OR= 84.0 (95%CI: 24.4-289.0)]

## DISCUSSION

Poultry production provides an important source of high quality animal protein. However, the high occurrence of infectious diseases among the poultry especially those on smallholdings pose a great danger to their productivity and survival. Infectious bursal disease (IBD) has continued to affect poultry production despite vaccination and attempts at improved control measures (El-Yuguda and Baba, 2004). This study showed that IBD virus antibodies are circulating in Japanese quails and indigenous chickens on smallholdings as well as pigeons in a live bird market in Osun and Oyo states, southwest Nigeria. In addition, IBDV antibody prevalence of 14.3, 93.3 and 6.6% was observed in Japanese quails, indigenous chickens and pigeons, respectively; an indication that the infection was more prevalent in chicken than in quails and pigeons. These findings are similar to previous reports, which stated that chickens are the most susceptible poultry species to IBDV infection (Geidam and Ambali, 2004) and support the possible carrier status of indigenous chickens in the transmission of the virus to other birds.

In this study, it was observed that the odds of detecting IBDV antibodies were 16 times higher in birds on smallholdings than in live-bird market. This could be due to the fact that birds (especially indigenous chicken) on smallholdings are often neglected and allowed to scavenge for food, thus exposing them to infectious agents. More so, infectious bursal disease virus is known to persist in contaminated environment because the virus is naked and resistant to harsh environment (Okoye, 1984). According to Mandeville *et al*. (2000), the IBD virus is unusually resistant to inactivation by cooking so there is a risk of introduction to the backyard flocks through uncooked chicken meat products since viable virus might be present in meat from apparently healthy chickens. Thus, infectious bursal disease is more likely to infect indigenous chickens which are majorly on free range in the study area. Furthermore, the detected IBDV antibodies in birds on smallholdings could also be due to little or no biosecurity and hygiene measures whereby farm handlers indiscriminately enter the pens sometimes with soiled and probably contaminated shoes and equipment. In addition, the detected antibodies may be due to vaccination activities of commercial poultry that may contribute to mild infection due to the spread of vaccine virus to local birds through commercial poultry workers (Salihu *et al.,* 2012).

The detected IBDV antibodies in pigeons in live-bird market may be due to their exposure to chickens and other birds from multiple sources having a higher tendency of circulating viruses (Killian, 2009) and may serve as a source of infection to other birds. Compared to birds on smallholdings, the lower seropositivity observed in pigeons in live-bird market in this study, may be due to the smaller sample size. This is as a result of the uncooperative attitude of the traders at the market concerning sample collection.

Infectious bursal disease has also been reported in other avian species other than chicken without observation of clinical signs indicative of infection; however, they have

been indicated to have the ability to support the replication of the virus (Benton *et al*., 1967). Thus, the detection of IBDV antibodies in unvaccinated apparently healthy pigeons and Japanese quails in this study indicate seroconversion following natural exposure to the virus and suggest that they could serve as reservoirs shedding the virus into the environment, thus playing a key role in the epidemiology of the disease. This is further supported by reports that IBD can be transmitted following the ingestion of litter contaminated with droppings of infected birds (Kazeem, 1986).

In conclusion, this study revealed the presence of infectious bursal disease virus in Japanese quails and indigenous chickens on smallholdings as well as pigeons in a live-bird market in southwest Nigeria. Since these birds were not vaccinated against IBD and were all apparently healthy, the detection of IBDV antibodies in their sera indicates that they were sub-clinically infected and could serve as reservoirs shedding the virus into the environment and perhaps, corroborate the suggestion that the inability to effectively control or eradicate the disease from poultry flocks in Nigeria may be due to limited information on the contributions of other avian species other than chicken in the spread of IBD virus (El-Yuguda and Baba, 2004). There is the need to consider these avian species in vaccination schedules for infectious bursal disease virus in Nigeria.

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