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Newcastle Disease, Infectious Bursal Disease and EDS '76 Antibodies in Indigenous Nigerian Local Chickens

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Abstract

A serological survey was conducted to determine the prevalence of Newcastle disease (ND), infectious bursal disease (IBD) and egg drop syndrome '76 (EDS '76) antibodies in indigenous Nigerian local chickens. The survey was carried out in Ekiti, Osun, Oyo, Ogun and Lagos States in southwestern Nigeria. Out of 2010 serum samples assayed for ND, 1890 (94%) were positive. 720 (34%) out of 2090 samples were positive for IBD, while 500 (29%) out of 1740 samples were positive for EDS '76. The prevalent rates are high enough to suggest that ND, IBD and EDS '76 are still very active in these indigenous chickens. The implications of these findings in the control of ND, IBD and EDS '76 in the commercial exotic poultry flocks are discussed.

Introduction

According to Akinwumi *et al.* (1979), there are about 134 million chickens in Nigeria of which 124 millions are indigenous local chickens. These indigenous chickens are reared under relatively uncontrolled extensive system of management such that 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. This observation has been made by Adene *et al.* (1985) and also on Marek's disease (Adene, 1983). Adene (1997) stated that in Nigeria, the indigenous (rural) poultry outnumber the commercial poultry by a ratio of 8:1 and they constitute the true poultry to over 70% of Nigerians. He further stated that an extra dimension to the findings on poultry disease pathotypes in Nigeria and most other developing countries, is the involvement of village chickens in the epidemiology of poultry diseases.

Some of the infectious diseases of commercial poultry identified in Nigeria are Newcastle disease (ND) (Hill *et al.*, 1953), infectious bursal disease (IBD) (Ojo *et al.*, 1973), and egg drop syndrome '76 (EDS '76) (Nawathe and Abegunde, 1980).

All ages of birds of different species are susceptible to ND. The acute and virulent form may result in mortality of up to 90% or more in affected flock with heavy loses

(Alexander and Allan, 1974). Infectious bursal disease, first described by Cosgrove (1962), is an acute contagious viral disease of poultry characterized by the inflammation of the bursa of Fabricius with its conspicuous enlargement. All breeds of chicken are susceptible, with those between 2-7 weeks being most susceptible (Ojo *et al.*, 1973), although infection has been reported in 20 weeks old birds (Durojaiye *et al.*, 1985). Mortality of between 20-45% and rapid morbidity reaching 100% in chickens has been reported (Onunkwo, 1975), while Louzis *et al.* (1979) reported mortality of 2-80% in pheasants. The economic losses resulting from IBD include not only the heavy mortalities, but also the immunosuppression precipitated by the damage to the bursa of Fabricius in survivors and sub-clinically infected chickens which result in increased susceptibility to other diseases (Adene *et al.*, 1985).

The EDS '76 is a viral disease of laying birds firdt described by Van Eck *et al.* (1976) and is characterized by sudden drop in egg production and laying of malformed eggs. Young birds, though susceptible to the virus, remain carriers until attainment of sexual maturity when the latent virus is activated and infection occurs. The outbreak of EDS '76 results in serious economic losses to the farmer and depletion of protein (eggs and poultry meat) to feed the growing population. Owoade and Durojaiye (1993) reported the laying of 249 shell-less eggs with a 30% drop in egg production in a poultry house of 8,000 caged layers.

In view of the epidemiological significance of the indigenous local chickens, a survey was carried out in some villages to determine the prevalence rates of ND, IBD and EDS '76, which are three very important and vital diseases of poultry in Nigeria. The results are presented in this report.

Materials and Methods

Survey Population

A total population of 2090 local chickens were screened in 5 States namely, Osun, Ogun, Lagos, Ekiti and Oyo. These chickens were reared by individuals in small flocks, the number ranging from 4-65 and their ages, in most cases could not be determined.

Preparation of Sera

Whole blood was collected from each chicken by jugular venapuncture. The blood was allowed to clot under atmospheric conditions and later transferred into a refridgerator (4°C) overnight. The serum was decanted and clarified by centrifugation at 1000r.p.m. for 15 minutes. The clear serum was stored in Bijou bottle at -20°C until tested.

Newcastle Disease Serology

Antibodies to ND were detected by the haemagglutination inhibition (HI) technique. Serial dilutions of each serum sample were

carried out in WHO microtitre plates using normal saline as diluent. Each dilution of serum was reacted with 4HA units of ND vaccine virus for 30-45 minutes at room temperature. 0.8% of chicken erythrocytes dispensed into every well, including the control wells was used as the indicator. Reaction was allowed to occur for 30-45 minutes after which the results were read. The HI titre of a serum was taken as the highest dilution of the serum which inhibited virus haemagglutination.

Infectious Bursal Disease Serology

Antibodies to IBD in the sera were determined by the agar gel precipitation technique as previously described (Durojaiye *et al.*, 1985). Briefly, 5mm wells were made in 1% oxoid agar gels in 5cm diameter petri dishes. The bursa of Fabricius from a clinical case of IBD was homogenized in a ten broeck tissue grinder and centrifuged. The supernatant, which served as the bursal tissue antigen, was collected and stored at –4°C until used. The central wells were filled with IBD homogenized bursal tissue antigen, while the peripheral wells were filled with sera. The results were first read at 18-24th hour and finally read at 72nd hour. The appearance of specific precipitin lines was taken as the indicator of a positive antibody reaction.

EDS '76 Serology

Antibodies to EDS '76 virus were detected by the use of the HI technique as described for the Newcastle disease serology. However, in this case, serum dilutions were reacted with 4HA units of the EDS '76 vaccine virus.

Controls

The controls consisted of hyper-immune sera prepared in chickens after two successive vaccinations with known positive antigens of ND, IBD and EDS '76. Birds (chickens) known to be free from ND, IBD and EDS '76 antibodies were used as negative controls. The chickens were kept away from other birds and were not vaccinated.

Results

Antibodies to ND and IBD were detected in sera obtained from all sampled areas. The point prevalence from all sampled areas ranged between 91% and 100% for ND and between 17% and 73% for IBD (Table 1). Antibodies to EDS '76 virus were detected in all the States sampled but in fewer number of samples and the prevalence rates varied between 3 and 60% (Table 1). A total of 2010 samples were examined for ND antibodies, out of which 1890 (94%) were positive. Out of 2090 samples examined for IBD antibodies, 720 (34%) were positive. Of 1740 samples examined for EDS '76 antibodies, 500 (29%) were positive. Quantitative antibody assay carried out by HI technique showed that HI titres ranged between 2 and 2048 for ND, and between 2 and 64 for EDS '76. HI antibody titres were much higher in ND positive sera when compared to the EDS '76 positive sera (Table 2).

Table 1
Serological Survey of Antibodies to ND, IBD and EDS '76 Viruses in Nigerian Local Chickens

Sampled Area	No. of samples tested/No. of samples positive			Percentage positive		
	ND	IBD	EDS '76	ND	IBD	EDS '76
Osun	550/540	540/90	310/10	98	17	3
Ogun	330/310	360/190	340/50	94	53	15
Lagos	100/100	150/110	150/90	100	73	60
Ekiti	60/60	60/30	60/20	100	50	33
Oyo	970/880	980/300	880/330	91	31	38
Total	2010/1890	2090/720	1740/500	94	34	29

Table 2
Range of Antibody Titres to ND and EDS '76 Viruses in Nigerian Local Chickens

Range of antibody Titres	Percentage of positive samples	
	ND	EDS '76
2-4	16.9	42.2
8-16	25.4	46.6
32-64	14.8	11.1
128-256	15.3	Nil
512-1024	10.0	Nil
2048	16.9	Nil

Discussion

The results of the serological survey of indigenous chickens in some Nigerian villages suggest a substantial activity of ND, IBD and EDS '76 in these chickens. Adene *et al.* (1985) stated that the Nigerian local chicken were possible carriers of IBD virus and could be important in the epidemiology of IBD in Nigeria. Fulminating ND outbreaks have been observed in flocks of Nigerian local chicken (Hill *et al.*, 1953), suggesting that these chickens are fully susceptible to ND and should be considered as an important factor in the epidemiology of ND. The overall prevalence rate of 94% obtained in this survey is indicative of a very high activity of ND in these chickens and strongly suggest that they could constitute infected carriers.

There is no vaccination programme for these roamy chickens at present and since their movement is unrestricted, they have the potential of continuously disseminating these viruses and infecting commercial exotic breeds of birds reared in intensively managed farms. It is clear therefore that successful control of these diseases must take cognizance of the role of the indigenous chickens in the circulation of viruses.

Adequate fencing of commercial poultry farm premises, the development of an effective vaccination programme for the local chickens, which in breeding flock serves the dual purpose of conferring immunity to the birds directly and on their offspring indirectly through maternal antibody transfer (Heller *et al.*, 1977) should be encouraged. This can be achieved through intensified veterinary extension services to local chicken owners which though occurring in small groups, constitute a high proportion of the total poultry population in Nigeria. When aggregated in these small communities, they form flocks large enough to merit vaccination. Also, the encouragement of semi-intensive husbandry for the keeping of the local chickens is considered helpful in the control of these viral diseases in Nigeria.

Further research on the epizootiologic complex and on the control of disease in rural poultry which would translate to the epizootiologic sanitation in both rural and industrial poultries (Adene, 1997) is advocated for. Also, considering the acknowledged ecological adaptations in rural poultry, studies on the varied pathotypes in the population might reveal peculiar resident strains for exploitation in vaccine developments.

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