Scientific Report

A serological survey for detection of avian infectious bronchitis virus antibodies in domestic village chickens in Esfahan, central Iran

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Summary

Infectious bronchitis (IB) is a very contagious disease caused by a coronavirus (IBV). In chickens, the virus affects the respiratory, reproductive, and urinary systems. This study was carried out to determine the seroprevalence of anti-IBV antibodies in domestic village chickens. Serum samples of 300 domestic village chickens from Esfahan (centeral Iran) were collected and examined for the presence of anti-IBV antibodies by commercial ELISA kits. The results showed that 85.3% of the domestic village chickens had high titers of anti-IBV antibody without any clinical signs. It was concluded that the rate of IBV infection in these chickens is very high that could be a potential hazard for commercial poultry.

Key words: Avian infectious bronchitis, IBV, Domestic village chicken, Serology

Introduction

Avian infectious bronchitis (IB) is an acute and highly-contagious disease of chickens. It was first described in 1931 in a flock of young chickens in the USA. Since then, the disease has been identified in broilers, layers and breeder chickens throughout the world. IB is caused by a coronavirus. It is an enveloped, single-stranded RNA virus. The disease is characterized by respiratory signs including gasping, coughing, sneezing, tracheal rales, and nasal discharge. In young chickens, severe respiratory distress may occur. In layers, respiratory distress, decrease in egg production, and loss of internal egg and egg shell quality are reported. Some strains of the virus cause severe kidney damage that may be associated with high mortality. The economic importance of IB is due to its impact on the chicken weight, feed conversion efficiency (FCE) and decline in egg production and hatchability. Although the chicken is the only bird that is naturally infected by infectious bronchitis virus (IBV), the virus has been isolated from pheasants, pigeons and guinea fowl (Cook, 2002; Cavanagh and Naqi, 2003). No response was observed in experimental aerosol inoculation of turkey. The domestic village chickens are one of the most important animal protein sources for villagers in developing countries. There is no report on the prevalence of the infection in domestic village chickens and the possible role of them in survival and spread of the virus. This study was conducted to determine the prevalence of IBV infection in chickens in Esfahan province, central Iran.

Materials and Methods

To determine the seroprevalence of anti-IBV antibodies in domestic village chickens, 300 blood samples were collected from

brachial vein of chickens with no history of vaccination against IBV from rural areas of Esfahan, in 2003. A commercial kit for enzyme-linked immunosorbent assay (ELISA) (KPL company) was used for the detection of anti-IBV antibodies in the sera. The results of the tests read by ELISA reader (Anthos 2010) based on optical density (OD) at 410 nm. One way ANOVA and chi-square tests (SigmaStat 2 software) were used for comparison of prevalence rates in different areas and correlation of prevalence of infection with seaseon, age and area, respectively. The chickens were categorized as young (<6 months) and adult (>6 months).

Results

Two hundred and fifty-six (85.3%) out of 300 sera were positive. ELISA titers of 189 to 83,739 were observed. The frequency of IBV-positive and negative sera is shown in Table 1. Totally, 256 (85.3%) of the sera tested were positive for anti-IBV antibodies. The highest mean titer of 13,279 was observed in southern areas while the lowest (9,886) was observed in the North. No statistically significant differences was found among different areas studied (P>0.01). No clinical signs were observed in chickens at the time of blood sampling.

The number of samples collected in three different seasons of autumn of 2002, and winter and spring of 2003 are shown in Table 2. The difference observed between different seasons was not significant (P>0.01). Considering the age of chickens, 138 (91%), and 118 (81%) out of 256 positive sera were observed in young and adult chickens, respectively (Table 3). The infection was significantly higher in young chickens (P<0.01). Totally, two systems of rearing were observed; some of chickens were free ranging (n = 95) and some were confined (n = 205). Sera of 70 and 92% of free ranging and confined chickens were positive, respectively; the difference was significant (P<0.01).

Discussion

IBV type 4/91 was detected in 33 samples (42.8%) from commercial broiler flocks in 16 provinces of Iran by RT-PCR technique. This showed a relatively high prevalence of IBV type 4/91 in Iran (Seyfi Abad Shapouri *et al*., 2004). Using embryonated chicken egg inoculations, IBV was isolated from 37 out of 546 tissue samples of commercial flocks during 1997–2000 in Iran. An antigenic difference between the field IBV isolate (designated as 2100/1) and the H120 Massachusetts vaccine strain was found in VN test (Vasfi Marandi and Bozorgmehri Fard, 2001). There is no published reports on IBV prevalence in non-commercial poultry in Iran. The infection rate was 43% of 177 free-ranging chickens in Qwa-Qwa district of the northeastern Free State province of South Africa (Thekisoe *et al*., 2003). The IBV seroprevalence was 56.5% in Backyard (free-range) village chickens in Yucatan, Mexico. All the Yucatan villages had chickens positive for antibodies against IBV (Gutierrez-Ruiz *et al*., 2000). More than 75% of 1,002 blood samples taken from 40

Table 1: Absolute and relative frequencies of IBV infected domestic village chickens in different regions of Esfahan province (central Iran)

Area (No.)	Samples (No.)	Mean titer	Region	Number of positive samples (%)	Number of negative samples (%)
Center (34)	34	10732	Esfahan	30 (88.2%)	4 (11.8%)
South (46)	46	13279	Mobareke	41 (89.1%)	5 (10.9%)
East (100)	31	11506	Ziar	26 (83.8%)	5 (16.2%)
	37		Mohammad Abad	32 (86.4%)	5 (13.6%)
	32		Khorasgan	28 (87.5%)	4 (12.5%)
West (65)	28	10015	Najaf Abad	23 (83.1%)	5 (17.9%)
	37		Tiran	31 (83.7%)	6 (16.3%)
North (55)	24	9886	Dastgerd	19 (79.1)	5 (20.9%)
	31		Gaz va Borkhar	26 (83.8%)	5 (16.2%)
Total (300)	300	10116		256 (85.3%)	44 (14.7%)

Swiss fancy breed chicken flocks had antibodies against IB (Wunderwald and Hoop, 2002).

Table 2: The absolute and relative frequencies of IBV infected domestic village chickens in three seasons

Season	No.	Seropositivity
Autumn	104	87 (84%)
Winter	107	92 (86%)
Spring	99	77 (87%)
Total	300	256(85.3%)

Table 3: The seroprevalence of IBV in young and adult chickens

Age	No. (%) of positive samples	No. (%) of negative samples
Young (<6 months)	138 (91)	12 (9)
Adult (>6 months)	118 (81)	31 (19)
Total	256 (85.3)	44(14.7)

In this study, 85.3% of the domestic village chickens tested were seropositive for IBV, which is almost the same as the results reported by Wunderwald and Hoop (2002). Our result is however, higher than the prevalence reported by Gutierrez-Ruiz *et al*., (2000) and Thekisoe *et al*., (2003). The chicken examined had no clinical signs at the time of examination and there was no history of vaccination against IBV, according to the owners statements. So it seems that the infection may occur without any considerable signs. As chickens had no history of vaccination, the high mean titer observed probably reflected the exposure to the field and low-attenuated strains of IBV present in the areas studied. On the other hand, some chickens showed low levels of antibodies which may be due to an exposure to low-pathogenic or vaccinal strains which are used in commercial poultry flocks routinly in the areas studied.

According to the recommendations of ELISA kit producers, high titers between 12,000 and 20,000 are usually related to the field challenge where variant IBV strains, (rather than those used in the live vaccination program) are likely to be presented on the farm. On the other hand, titers expected for IBV at the processing plant can be between 4,000 and 5,000. These high titers are related to a good vaccine immune response and the interaction with residual IBV on the farm (IDEXX laboratories, livestock and Poultry Newsletter, August 2003). The mean titer of chickens was more than 10,000 in this area. So it seems that more attention should be paid for biosecurity of the domestic village chickens and commercial poultry flocks when the villagers are employed. For prevention of the spread of the IBV, the routin vaccination of domestic village chickens is therefore, suggested.

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