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ROLE OF FREE LIVING DESI CHICKEN IN THE EPIDEMIOLOGY OF NEWCASTLE DISEASE

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Abstract: Newcastle disease (ND) is one of the major viral diseases of poultry causing great economic losses to the poultry industry. This study was aimed to assess the role of desi chicken in the epidemiology of ND. A total of 115 cloacal swabs/droppings from desi chicken were collected and inoculated into specific pathogen free embryonated chicken eggs for isolation of Newcastle disease virus (NDV). Only one NDV isolate was obtained out of 115 cloacal swabs inoculated and the isolate was characterized as velogenic pathotype based on mean death time (MDT) and intracerebral pathogenicity index (ICPI). It is concluded that desi chicken may play an important role in the transmission of NDV to domestic chicken. Hence biosecurity measures have to be strictly followed for avoiding the contact between desi chicken and domestic chicken for effective prevention of ND.
Keywords: Newcastle disease, desi chicken.

Introduction

Newcastle disease remains a constant threat to the poultry industry and is a limiting disease for poultry producers worldwide (Cattoli *et al.*, 2011). It may represent a bigger drain on the world economy than any other animal viral disease (Alexander, 2003). Apart from commercial poultry, a wide range of captive and free living birds are susceptible and can act as primary source of ND infection to chicken (Kouwenhoven, 1993; Alexander and Senne, 2008). Limited work has been done to know the role of free living birds like desi chicken, caged pet birds, turkeys, geese, pigeons, sparrows, crows etc. in the spread of the ND to

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commercial chicken (Raghavan *et al.*, 1998). Hence, this study is aimed to assess the role of desi chicken in the spread of ND.

Materials and Methods

A total number of 115 cloacal swabs/droppings from desi chicken were collected in phosphate buffered saline at Chennai, Tamil Nadu, India, and centrifuged at 1500 g for 15 minutes at 4^{o}C. The supernatant was treated with penicillin at the rate of 10,000 IU/ml and of streptomycin at the rate of 10mg/ml used for virus isolation. Virus isolation, identification and characterization were carried out by the procedures described by Alexander and Senne (2008). The supernatants of cloacal swabs were inoculated into 9-10 day old specific pathogen free embryonated chicken eggs through allantoic cavity route and incubated at 37^{o}C. Those embryos died within 24 hours after inoculation was considered as non-specific and those embryos that died after 24 hours were chilled. Amnio-allantoic fluid (AAF) collected from the dead embryos were subjected to haemagglutination (HA) test with 1 percent washed chicken erythrocytes and all the dead embryos were examined for the presence of characteristic NDV lesions. The AAF samples which were not agglutinating chicken erythrocytes at first passage were subjected to two more blind passages in embryonated eggs. Spot HA test was carried out at each passage level and the samples which showed the HA activity were confirmed by haemagglutination inhibition (HI) test by using specific NDV antiserum raised at the Department of Animal Biotechnology, Madras Veterinary College, Chennai. The viral isolate obtained was characterized by mean death time (MDT) in specific pathogen free embryonated chicken eggs and intracerebral pathogenicity index (ICPI) in day old chicks.

Results and Discussion

Out of the 115 number of cloacal swabs from desi chicken inoculated into the embryonated chicken eggs, only one sample yielded NDV isolate at III passage level. The embryo death was noticed at 48 hours post inoculation and the HA titre of AAF was found to be 512. The HI titre reciprocal of the serum dilution was 64. The dead embryo showed hemorrhage on the cranium. The viral isolate has ICPI value of 1.68 and as per Werner *et al.* (1999), NDV with ICPI value of above 1 are considered as velogenic. Mean death time of the NDV isolate obtained in this study was 64 hours and identified as mesogenic pathotype based on this test. Even though MDT was considered as an important tool in characterizing different isolates, it has been reported to be imprecise particularly when used to characterize isolates from hosts

other than chicken (Alexander, 1988). Based on the ICPI value the NDV isolate obtained in this study might be of velogenic pathotype.

Discussion

Newcastle disease virus obtained from desi chicken is an indication that the free living desi chicken can be a natural reservoir of NDV and act as a source of infection to commercial poultry. Village chickens act as reservoirs of virulent NDV and must also be considered a continuing threat to poultry population throughout the world (Alexander, 2003). An earlier report by Alexander and Parsons (1986) has indicated that increase of virulence of NDV isolates from other poultry when passaged in chickens. Such possibilities caution the importance of free living desi chicken as NDV reservoirs. Identification of NDV isolates in this study is evidence of the need for continuous characterization of NDV strains of all pathotypes which will provide a better understanding of the diversity that exists as suggested by King and Seal (1997). Single stranded RNA viruses which lack of proof reading and post replicative error correction mechanisms are expected to have high mutation rate and therefore to evolve rapidly (Koonin and Dolja, 1993). Immune system of the birds may force the virus to evolve more rapidly in order to create escape mutants, which in turn might lead to the emergence of a few mutants and avoid clearance by the hosts immune system and such mutants have the ability to spread widely and cause epidemics in chickens (Ke *et al.*, 2001).

Conclusion

Hence in this scenario, biosecurity measures should be strictly adhered to break the contact of commercial poultry with desi chicken for prevention of spread of NDV from desi chicken to commercial poultry.

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