

Pathogenesis of nephropathogenic IBV MH5365/95 in SPF chicken

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Introduction

Avian infectious bronchitis virus (IBV) infects chicken and predominantly causes respiratory symptoms. Other systems affected are the reproductive, gastrointestinal and urinary.

The newly characterized nephropathogenic IBV strain MH5365/95 causes high mortalities and severe kidney lesion. The virus replicates in renal epithelial cells, producing severe tubular damage and interstitial inflammation resulting in renal failure. Lesions described include pale parenchyma, swollen, mottled and uric acid deposits in the tubules and ureters. The objective of the work is to study the clinical signs, pathological changes and histopathological lesions of the respiratory tract and kidney in chickens infected via intratracheal and intraocular routes with IBV-MH 5365/95 strain.

Materials and Methods

The nephropathogenic IBV-MH5365/95 of passaged two, was used in this experiment. Seventy-five of 21-day old SPF chickens were divided into 3 groups namely; Group 1, Group 2 and Group 3 which consisted of 30, 30, and 15 chickens, respectively.

Each infected chicken received 0.2 ml of virus containing 10⁵EID₅₀/ml. Group 1 chicken received the virus intratracheally whereas Group 2 chicken received the virus intraocularly. Control group was further divided into two subgroups (C1=7 and C2=8), receiving 0.2ml of PBS intratracheal and intraocular, respectively. During the 24-day course of post infection (pi.), clinical signs were recorded daily. About 4-5 chickens were killed at the interval of 3 days as follows; 3, 6, 9, 12, 15, 18, 21, and 24 days. Those chickens, which were killed or died were necropsied and examined for the presence of gross lesions in the trachea, lungs, air sacs, kidney, liver, gall bladder, spleen and gastro-intestinal tract (GIT). Selected tissues namely the trachea, lung, kidney, and intestine were sampled. The tissues were fixed in 10% phosphate buffered formalin and processed for paraffin block using standard procedure before staining with haematoxylin and eosin.

Results and Discussion

Chickens infected with IBV by the two routes namely intratrachea and intraocular, showed essentially similar clinical signs of ruffled feathers, depressed, severe to moderate respiratory signs include gasping, sneezing, coughing and tracheal rales. Gross pathological changes include congested tracheas with excess mucus in the lumen at day 3, 6, and 9, pi. in both infected groups. However, some differences were observed in the time of onset of clinical signs, severity of clinical disease, and the rate of recovery. Chicken infected with IBV intratracheally showed faster onset of clinical sign, longer disease duration with severe condition, compared to those infected intraocularly. The latter group showed delayed onset of clinical signs, shorter disease duration with moderate disease condition. In both groups, although the respiratory sign disappeared by about 2 weeks pi, there is no complete recovery from respiratory system. Among other pathological changes in the lung, cloudiness of the air sacs were detected during the first week of infection, which is in accordance with the finding in Australian T-strain following aerosol infection.

Comparing between the two infected groups, incidence of nephritis-nephrosis did not differ between the groups. This is in agreement to earlier findings who noted that the birds infected by the in-contact route produced a similar pathogenesis to those infected by other routes. Congestion of the GIT, whitish-green watery diarrhoea and congested liver and spleen observed in this study have also been reported by others with different IBV strains. Lesion observed in these organs may indicate the wide spectrum of the virus tissue tropism in chicken.

The histological changes reported here were characterized by prominent lesions in the kidney, followed by respiratory tract involvement. These changes are compatible with those described previously. However, the dilation of Bowman's capsule is in agreement with Chen et al., (1996), but disagreement with others. The basophilic globules which looked-like inclusion bodies seen in degenerated epithelium of trachea and renal, has been also reported by others. Upon close examination on the onset of interstitial lymphocytic reaction, infected chicken suffered from nephrosis initially, and later followed by nephrosis-nephritis before end-up with interstitial nephritis. The detail histopathological changes of degeneration and desquamation of enteric villi with infiltration of inflammatory cells observed in this study, have not been reported elsewhere. Thus, there is a speculation that IBV-MH 5365/95 may multiply in the intestinal tract. The present study demonstrated that IBV-MH 5365/95 may induces a primary renal disease and moderate to severe effects on the respiratory and intestinal tracts.

Conclusions

Infectious Bronchitis Virus-MH5365/95 strain induces moderate to severe respiratory disease, diarrhoea and renal disease. Routes of inoculation did not significantly influence the pathogenesis of IBV. Lesion observed in many organs may indicate the wide spectrum of the virus tissue tropism in chicken. In transmission studies, the virus was found to induce a primary renal disease and moderate to severe effects on the respiratory and intestinal tracts.

Benefits from the study

Providing new knowledge and information on the pathogenesis of the bronchitis disease virus in chicken and the expected outcome of the clinical sign. The involvement of many vital organ denotes the wide spectrum properties of the virus. This information is useful for field veterinarian to monitor the IB disease outbreak in the field.

Patent(s), if applicable:

Nil

Stage of Commercialization, if applicable:

Nil

Project Publications in Refereed Journals:

Nil

Project Publications in Conference Proceedings

1. Arshad, S.S. and Al-Salihi, KA. 2001. The Effect Of Different Routes Of Infectious Bronchitis Virus Inoculation In ChickensHistopathology. In: Proceedings of the 13th VAM Congress, Kuala Lumpur, 27-30 Oktober. 2001; p 64-66
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3. Arshad, S.S. 2001. Avian Infectious Bronchitis Virus: In: Proceedings of the Persidangan Kebangsaan Penyelidikan Dan Pembangunan IPTA. 25-26 Oktober 2001, Kuala Lumpur. p 157.

Graduate Research

Name Graduate	of Research Topic	Field of Expertise	Degree Awarded	Graduation Year
Karima Al-Salihi	Pathogenesis of IBV in SPF chicken: clinical sign, gross lesion and immunoperoxidase	Animal bacteriology	Post-doctoral	

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