PATHOGENICITY AND IMMUNOGENICITY OF INFECTIOUS BURSAL DISEASE VIRUS IN POULTRY

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Introduction

Outbreak of infectious bursal disease (IBD) in poultry involving a highly pathogenic strain of serotype 1 IBD virus (IBDV) was first reported in Malaysia in 1991 (Hair-Bejo, 1992). Since then, the disease has become one of the most threatening diseases in poultry industry in the country. Outbreaks of IBD continue to occur in both the vaccinated and non-vaccinated flocks. The outbreaks caused great economic losses due to high mortality, impaired growth, high carcass condemnation and profound immunosuppression. Mixed infection of IBD with other viral or other pathogens are commonly reported (Hair-Bejo, 1993a). Evaluation on the safety and efficacy of the imported IBD vaccines for local used available in the market commercially demonstrated that most of the vaccines studied were consider to be unsafe and not effective to confer full protection against the IBDV field challenged . It is an urgent need to isolate, characterise and determine the pathogenicity and immunogenicity of local isolates of IBDV for its usage in the development of local IBD vaccine which is more immunogenic and protective against the disease.

Materials and Methods

Local isolates of IBDV were obtained from IBD field outbreaks. The virus was isolated, adapted, propagated in 9 to 11-day-old specific pathogen free (SPF) embryonated chicken eggs (CAM), chicken fibroblast (CEF) tissue culture and in both the SPF and commercial broiler chickens. The isolates were also characterised using the conventional and molecular techniques. Selected IBDV isolates were attenuated either by passages in CAM and CEF tissue culture or by back passages in SPF chickens. The pathogenicity and immunogenicity of the isolates were determined at various intervals throughout the passages in susceptible commercial broiler and SPF chickens. The highly pathogenic isolate was used for IBD challenge virus, whilst the highly immunogenic isolate with low in pathogenicity was used for IBD viral seed in the development of IBD vaccine. The safety and efficacy of the vaccine were determined in both the commercial and SPF chickens.

Results and Discussion

Fourteen local isolates of IBDV from recent IBD field outbreaks in broilers, layers and village chickens were successfully isolated and propagated CAM, CEF tissue culture and in both the SPF and commercial chickens. Some differences in the pathogenicity and immunogenicity of the isolates were demonstrated (Hair-Bejo, 1993b).). A highly pathogenic isolate of IBD identified as UPM 94283 was successfully identified. The isolate caused 100% mortality in SPF chickens. It caused severe haemorrhages and necrosis of the bursa of Fabricius. Severe haemorrhages also occurred in the muscles and at the junction of the proventriculus and gizzard. Following oral inoculation, the virus initially replicate in the lymphoid cells in the intestinal tract leading to primary viraemia and replication of the virus in the bursa of Fabricius, the target organ for IBD. The virus can also enter into the bursa directly through the intestinal lumen. Localisation and replication of IBDV in the bursa caused severe bursal necrosis and a secondary viraemia leading to destruction of other lymphoid organs, especially the thymus and spleen (Hair-Bejo et al. 1997). The highly immunogenic with low in pathogenicity isolate of IBDV was selected and attenuated in CAM and CEF tissue culture. A live attenuated IBD viral seed for vaccine development identified as UPM 93273 was successfully developed (Hair-Bejo, et al. 1998). The viral seed (vaccine) prepared in CAM is highly immunogenic and able to induce high level of IBD antibody when inoculated in both the SPF and commercial chickens. The vaccine also able to neutralise a high level of IBD maternally derived antibody (MDA). It is safe and effective to confer full protection against IBDV challenged when given in chickens either for a single vaccination at day 14 of age or double vaccination at days 14 and 28 of age. The vaccine is also safe and effective to be used for *in ovo* vaccination at 18-day-old embryonated chicken egg. Preliminary studies on the pathogenicity and immunogenicity of the local IBD viral seed prepared in CEF tissue culture showed unsatisfactory results. Further study is required for the development of a live attenuated IBD vaccine prepared in CEF tissue culture. The tissue culture prepared vaccine can reduce operational costs and shorten production time. The local IBDV isolates will also be used for the production of local IBDV reagents and local diagnostic kits for rapid diagnosis of the disease.

Conclusions

The study has successfully isolated fourteen local isolates of IBDV form recent IBD outbreaks in poultry in the country. The isolates were varied in their pathogenicity and immunogenicity. A highly pathogenic isolate was used as IBD challenge virus, whilst a highly immunogenic with low in pathogenicity IBDV isolate was used for the development IBD vaccine. A live attenuated IBD vaccine was successfully developed using SPF embryonated chicken eggs. The vaccine is safe and effective to confer full protection against IBDV challenged.

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