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Isolation, Molecular Characterization, and Pathogenicity Testing of Duck Hepatitis A Virus Isolates

By

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Abstract

The current study was conducted to investigate the prevalence of DHAV in duckling flocks from different Egyptian provinces and to conduct a comparative pathogenicity testing of the identified strains in Pekin and Muscovy ducklings. Suspected samples ($n=30$) were collected from 3-21-day-old ducklings farms (500-5000 birds) between 2012 and 2017, Pekin ($n=23$), Mulard ($n=5$), and Muscovy ($n=2$). Diseased ducklings showed a history of nervous signs and mortality rates (5-80%). Samples were collected from the livers of freshly dead birds. Regarding geographical distributions, obtained samples from Beheira ($n=9$), Alexandria ($n=6$), Gharbia ($n=7$), Kafr El-Sheikh ($n=5$) and Giza ($n=3$) provinces in Egypt. Samples were screened for DHAV-1 using reverse transcriptase polymerase chain reaction (RT-PCR) by amplification of genomic regions in the 5'UTR and 3D gene, respectively. Seven out of thirty (23.3%) of the collected samples were confirmed as DHAV-1. Six out of seven (85.7%) of the confirmed samples were successfully isolated onto 9-day-old embryonated specific-pathogen-free chicken eggs via the allantoic sac inoculation. Gross pathological changes in embryos included stunting and subcutaneous hemorrhages. The embryo livers exhibited necrotic foci and allantoic fluid showed greenish-yellow coloration. Phylogenetic analyses based on the full-length VP1 gene were performed on these isolates using accessible reference strains in GenBank revealed that obtained DHAV-1 field isolates were clustered into genetic group 4 closely related to circulating strains in Egypt. Considerable changes were observed between obtained field isolates and the strain of the commercially available vaccine in Egypt. Pathogenicity testing in Pekin and Muscovy ducklings was conducted using Eg/HL-1/15 and Eg/F219/14 strains based on detected point mutations. Both strains induced clinical signs of lethargy and ataxia, as well as opisthotonos in experimentally infected day-old Pekin and Muscovy ducklings. No significant variation in mortality rates (80%) was detected in Pekin duckling groups; however, mortality ranged (60-80%) in Muscovy ducklings. Pekin ducklings showed characteristic gross lesions of piebald liver, however, Muscovy ducklings exhibited severe liver congestion. Histopathological findings supported gross pathological observations. Muscovy showed severe vacuolar degenerative changes while Pekin livers showed signs of hemorrhage and necrosis. In conclusion, these data provide updated information on the genetic diversity of DHAV-1, which may be expected to contribute significantly to design a control strategy and novel vaccine development of DHAV-1 in Egypt. Furthermore, the study highlighted the comparative pathogenicity of Egyptian DHAV-1 isolates in experimentally infected Pekin and Muscovy ducklings.

REFERENCES

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