

Outbreak of Endotheliotropic Herpes Virus Infection in Elephant Population of Odisha India - A Wakeup Call



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Abbreviations: EEHV: Elephant Endotheliotropic Herpesvirus; ELISA: Enzyme Linked Immuno Sorbent Assay; PCR: Polymerase Chain Reaction; EHV: Endotheliotropic Herpesvirus

Opinion

Recently (August -September 2019), 04 captive elephants of Nandankanan Zoological Park (20.3958°N, 85.8260°E) and 01 wild elephant of Chandaka-Dampara sanctuary (20.4178°N, 85.7500°E), all below 15 years of age, died of endotheliotropic herpesvirus (EHV) infection. Such unusual outbreak became breaking news across the globe and many questions were also raised from different corner of the society. A brief description of the disease is outlined here with an idea not only to clarify doubts but to simulate healthy minds to evolve practical solutions including innovative and new approaches not to repeat the history in future – need of the day to save this pachyderm. Elephant Endotheliotropic herpesvirus (EEHV) infection is an acute viral disease that affects exclusively elephants and more specifically Asian elephant (*Elephas maximus*). The taxonomic classification of EEHV has the genus Proboscivirus, subfamily Betaherpesvirinae, family Herpesviridae and order Herpesvirus. There are eight members of this genus viz., EEHV1A, EEHV1B, EEHV2, EEHV3, EEHV4, EEHV5, EEHV6 and EEHV7. Of which, EEHV1 is the most common and fatal. The discovery of DNA from the causative agent EEHV1 in a 16month old female calf in 1999 established it as a novel endotheliotropic herpesvirus. This disease has been reported earlier from Kerala, Karnataka and Assam. In Odisha incidence of EEHV infection is confirmed now through laboratory tests, though it was suspected since 2013 based on field reports.

In the wild, infection is usually ubiquitous and occurs predominantly in asymptomatic manner. Elephant calves

deprived of maternal immunity are more susceptible to infection and the disease is considered fatal in such age groups. Presumably, virus enters body through oral route and initiates pathogenicity within 1-2 weeks. The virus has got affinity for endothelium and thereby causes damage to the lining of small blood vessels especially of the capillaries of internal organs. This results in leakage of blood out of the vessels with progressive loss of hemoglobin and platelet. Three forms of the disease have been recognized i.e., peracute, acute and subacute in their decreasing order with respect to duration of illness and intensity of signs. Disease is characterized by loss of appetite, drowsiness, high rectal temperature, facial edema, limping, cyanosis of tongue, watery feces, dehydration, petechial hemorrhage, and conjunctivitis. Necropsy findings of EEHV infection include extensive hemorrhages in internal organs like heart, lungs, liver, kidney, brain intestine, omentum, etc. In our investigation, all the four captive elephants died within 24 hours of showing clinical signs that suggested peracute form of the disease whereas the wild elephant died after prolonged recumbence of 4 days. Clinical signs are post-mortem changes corroborated the present outbreak. Ante-mortem diagnosis of EEHV is based on the clinical signs, hematobiochemical alterations, detection of the pathogen in electron microscopy, and molecular tests.

Identification viral DNA in trunk wash and/or blood by polymerase chain reaction (PCR) is the gold standard in the field of diagnosis. Serological test such as enzyme linked immuno sorbent assay (ELISA) has been able to detect the presence of

IgG antibodies for EEHV. It can be used for seroprevalence study both in carrier as well as latent phase. It can also determine the level of immunity in calves due to maternal antibodies. It is fact that some apparently healthy elephants shed the virus either continuously or at intervals. Periodic examination of blood and trunk wash through PCR may detect such shedders. It is proper to mention here that such molecular diagnostic test facilities available in Centre for Wildlife Health, Odisha University of Agriculture and Technology confirmed the disease through detection of U 38 gene at 520bp. The NGS study is in pipeline to unveil more scientific information. As onset of the disease is very fast with involvement of multiple vital organs, the prognosis of the disease is usually grave. Case fatality touches upto 85%. However, early diagnosis followed by prompt treatment enhances survival rate of this dreadful disease. Anti-viral drug like acyclovir, famciclovir or ganciclovir through oral or intravenous route are the primary drug of choice. Besides, supportive and symptomatic drugs are administered to address concurrent problems. Oral administration of acyclovir with other supportive measures failed to save life. At times, plasma transfusion is recommended to combat low platelet count.

No commercial vaccine is available for prophylactic purpose. However, vaccine available in USA against EEHV1 may be tried

in captive elephants only. Stress from various origins seems to be one of the major risk factors that trigger the expression of this disease in carriers. Fragmentation of elephant corridors, non-availability of adequate fodder and water, escalation of anthropogenic activities in forest areas, high environmental temperature due to climatic change, and increased environmental pollution are considered as important stressors. Keeping in mind the endangered status of elephants on IUCN Red list, there is a need to take immediate action to bring the animal and man into harmony so that they can sustain together. Researchers are now focusing on new methods of screening of various strains of elephant herpes virus and phylogenetical analysis to trace the divergence of several EEHVs. Currently, of 13 Asian elephant range countries, only 3 (Thailand, Indonesia and India) have established laboratories capable of confirming EEHV. International Elephant Foundation in partnership with the Smithsonian Institution, Johns Hopkins School of Medicine, Cornell University and Baylor College of Medicine has been at the forefront on testing, research and dissemination of herpes virus information for the global elephant community. sharing of the knowledge, interaction with the wildlife experts, strengthening of research laboratories, sensitization of the public, and involvement of the community workers would help to combat the emerging disease in vulnerable regions.



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