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Serological Evidence of Bovine Herpesviruses 1 and 2 in Asian Elephants

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ABSTRACT: Antibodies were detected against bovine herpesviruses 1 (BHV 1) and 2 (BHV 2) in Asian elephants (*Elephas maximus*) using the passive hemagglutination (PHA) test. The study was conducted during May to December 1994 using sera collected from zoological gardens and national parks in India. Four (4%) of 109 elephant sera had PHA titers ranging from 1:8 to 1:32 against BHV 1. Twenty-five (23%) of the 109 elephant sera had PHA titers ranging from 1:8 to 1:64 against BHV 2. Asian elephants appear to be better reservoirs for herpesviruses which are serologically related to BHV 2.

Key words: Asian elephant, bovine herpesvirus 1 and 2, *Elephas maximus*, serologic survey.

Bovine herpesvirus 1 (BHV 1) was isolated from wildebeest (*Connochaetes taurinus*) affected with vulvovaginitis following betamethasone injection (Karstad et al., 1973). Hoff et al. (1973) isolated BHV 1 from pronghorn antelope (*Antilocapra americana*). Ek-Kommonen et al. (1986) reported isolation of herpesvirus serologically related to BHV 1 from reindeer (*Rangifer tarandus*) after dexamethasone treatment. Bovine herpesvirus 2 (BHV 2) which causes pseudolumpy skin disease or bovine herpesvirus mammillitis in cattle in the Republic of South Africa was isolated from a cape buffalo (*Syncerus caffer*) with generalized fatal disease in Tanzania (Schiemann et al., 1971).

McCully et al. (1971) reported herpesvirus associated nodules in the lung of African elephants (*Loxodonta africana*). Jacobson et al. (1986) showed that 27 African elephants were heavily affected with proliferative cutaneous lesions attributed to herpesvirus. Pilaski and Bosenwolff (1988) described herpesvirus related nodular and warty skin lesions in Asian elephants (*Elephas maximus*). Metzler et al. (1990) reported the death of a 3-yr-old Asian elephant in Switzerland following generalized manifestation of herpesvirus infection. Metzer et al. (1990) detected antibodies against bovine herpesvirus in 15 elephant sera by protein-A mediated immunoprecipitation test. The extent of reaction was most distinct with BHV 2 antigen; it was less prominent with BHV 1 antigen, and least evident with BHV 4 antigen. The present investigation was conducted in order to determine the prevalence of antibodies against BHV 1 and BHV 2 in Asian elephants in southern India.

Blood samples were collected from animals in national parks throughout southern India including J. Jayalalitha Wildlife Sanctuary in Mudumalai; Indira Gandhi Wildlife Sanctuary at Topslip; Nagarahole, Kallala and Karekoppa camps in the Nagarahole Range; Maldare, Dubare and Hudgur camps in the Madikeri Range; Thyavarekoppa Lion Safari and Sakrebailu camps in the Shimoga Range in the western Ghat region (10°38′N to 13°54′N, 75°35′E to 77°00′E), and zoological gardens including Guindy Children's Park in Madras (13°35′N, 80°13′E), Arignar Anna Zoological Park (13°00′N, 80°10′E), and Andaman and Nicobar Islands (5°25′N to 12°34′N, 90°14′E to 90°13′E). The study was conducted from May to December 1994. Sera were collected from 109 tamed elephants of different forest camps maintained by the governmental Forestry Department in the study area.

The bovine herpesvirus 1 and 2 samples supplied by the Federal Research Center for Virus Diseases of Animals (Tubingen, Germany) was used for antigen prepara-

tion. BHV 1 and BHV 2 hyperimmune sera were produced in domestic rabbits. Negative sera were collected from rabbits before injecting the respective herpesviral antigen. Madin Darby bovine kidney (MDBK) cells (National Facility for Animal Tissue Culture and Cell Culture, Pune, India) were used for virus cultivation. The method of Shimizu et al. (1972) was followed for antigen preparation. The passive hemagglutination (PHA) test was performed using gluteraldehyde coated chicken erythrocytes (Sigma, St. Louis, Missouri, USA) as described by Suresh (1992).

Four (4%) of 109 elephant sera had PHA titers ranging from 1:8 to 1:32 against BHV 1. Twenty-five (23%) of 109 elephant sera had PHA titer ranging from 1:8 to 1:64 against BHV 2.

Suresh (1992) and Rajarman et al (1994) used the PHA test for detection of BHV 1 antibodies in domestic animals. Routinely, a PHA titre of $\geq$1:8 is considered positive for BHV 1 and BHV 2. Herein, BHV 1 and BHV 2 is reported for the first time from elephants in India. The titers of antibodies were higher to BHV 2 than to BHV 1 in the Asian elephant. Similar results were observed in captive elephants by Metzler et al (1990). Roizman and Batterson (1985) hypothesized that most mammals are hosts for at least one type of herpesvirus. These types persist in the host, probably in latent form, which at times may become reactivated. Factors responsible for the onset of clinical disease is not clear. Our results show that Asian elephants apparently are better reservoirs for herpesviruses which are serologically related to BHV 2.

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