Sir,

Japanese encephalitis outbreaks occur frequently in 14 Asian countries with about 3060 million people at risk of infection. JE is a major public health concern due to its high epidemic potential, high case fatality and neuropsychiatric sequelae among survivors. The estimated global burden of JE was 709000 disability-adjusted life years (DALYs) lost in 2003. Epidemiology of JE is complex due to involvement of several vertebrate and invertebrate hosts. JEV is transmitted naturally between ardeid birds and pigs by mosquitoes species mostly belonging to Culex genera. The Culex vishnui subgroup mosquitoes comprising Cx. tritaeniorhynchus, Cx. vishnui and Cx. pseudovishnui have been implicated as major vectors of JE in India. JE epidemics have been frequently encountered in several States of India. Occurrence of JE epidemics is a regular feature in Gorakhpur, Uttar Pradesh (UP), since the first major JE epidemic in 1978. A total of 2320 suspected cases and 528 deaths of JE from Uttar Pradesh mostly from Gorakhpur were reported in 2006. Thus, serological and entomological observations were made to confirm the aetiology of a focal outbreak of JE in rural areas of Gorakhpur Division, UP in 2006.

Gorakhpur division is mainly a paddy growing area, with clay soil and a very high water table. It has seven districts including Gorakhpur district. Gorakhpur district in UP has an area of 3483.8 sq. km with a population of 37,69,456 (2001 census). The village ecosystem of Gorakhpur comprised rivers, lakes, irrigation canals, reservoirs and rice fields during JE transmission season (July-November).

During September 2006, 17 serum samples were collected by hospital staff with informed consent from suspected JE cases admitted in BRD Medical College Hospital, Gorakhpur and screened for JEV IgM antibodies by MAC ELISA (supplied by National Institute of Virology, Pune). Two samples were found positive for JEV IgM antibodies. Entomological investigations were conducted in JE affected villages in the districts namely, Basti, Deoria, Gorakhpur, Kushinagar, Maharajganj, Santkabir Nagar and Sidharth Nagar which are under Gorakhpur Division. Mosquitoes resting on vegetation and bushes around cattlesheds and pigsties were collected after dusk with the help of oral aspirator and transported to the laboratory at CRME for identification. A total of 2289 mosquitoes, belonging to 19 species and 5 genera, namely, Ae. pallidostriatus, An. barbirostris, An. hyrcanus (gr), An. palidus, An. peditaeniatus, An. stephensi, An. subpictus, Ar. subalbatus, Cx. epidesmus, Cx. fuscocephala, Cx. gelidus, Cx. infula, Cx. pseudovishnui, Cx. quinquefasciatus, Cx. tritaeniorhynchus, Cx. vishnui, Ma. annulifera, Ma. indiana, Ma. uniformis, resting in and around the cattlesheds were collected. Cx. tritaeniorhynchus, the primary vector of JE was the dominant species and comprised 40.8 per cent of the collection. All the mosquitoes were pooled species-wise and screened for JEV infection by using antigen capture ELISA and insect bioassay. JEV infection was detected in female Cx. tritaeniorhynchus (2 pools out of the total 51 pools with 938 specimens) and Cx. epidesmus (1 pool out of 2 pools with 29 specimens) tested by ELISA. But JEV could be isolated only from Cx. tritaeniorhynchus by the Toxorhynchites-IFA (Insect bioassay) test. Isolation of JE virus from Cx. epidesmus has been reported in Bankura, West Bengal. However, JE virus infection in vector mosquitoes was not reported from Gorakhpur except a single isolation from wild caught Cx. tritaeniorhynchus during the 1991 outbreak.

JEV is a mosquito-borne, zoonotic flavivirus that infects vertebrate hosts, primarily birds and swine, in an enzootic cycle. Japanese encephalitis virus is maintained in nature in a cycle involving mosquitoes and birds belonging to the family Ardeidae. A fairly
high proportion of cattle egrets and pond herons possess neutralizing antibodies to JEV indicating that these birds are the natural reservoir of JEV\textsuperscript{11}. Higher seroconversion rates in children were observed in villages with herons when compared with villages without herons\textsuperscript{13}. Gorakhpur has several large perennial lakes and swamps which provide a wintering and staging ground for a number of migratory waterfowl and a breeding ground for resident birds\textsuperscript{13}. In addition, rice fields also support waterfowl, especially egrets and herons that are the reservoirs of JEV.

In India, more than 135 million pig population has been reported, and among the States, 31.7 per cent pigs are in (42.84 million) UP\textsuperscript{14}. The rural people who rear pigs, virtually co-exist with these animals. Hence, chances to infect humans increase because pigs are the amplifier vertebrate hosts of JE virus\textsuperscript{15}.

Gorakhpur district has undergone a lot of ecological changes like construction of irrigation canals and dams that enhanced the expansion of rice culture, which promoted the breeding of the major and secondary mosquito vectors of JE\textsuperscript{16}. It appears that environmental factors conducive for the breeding and survival of JE vectors especially \emph{Cx. tritaeniorhynchus}, and the presence of a large number of vertebrate amplifying hosts like pigs may contribute to the persistence JEV in this region. Zoonotic nature of JE, and lack of awareness of the ecological implications of regional environmental transformations promoted disease emergence\textsuperscript{17}.

Surveillance for JE in endemic areas is mainly based on clinical case reporting and abundance of vector mosquitoes. The monitoring of virus infection in vector mosquitoes should form an essential component of a surveillance system. The building of the vector density and virus infection during epidemic season warrants the need for strengthening the laboratories of surveillance units to monitor JE virus infection in vector mosquitoes in Gorakhpur region.

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